

THE PEDAGOGICAL SEMINARY AND
**JOURNAL OF
GENETIC PSYCHOLOGY**

Child Behavior, Animal Behavior,
and Comparative Psychology

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VOLUME 66

1945

Copyright, 1945, by The Journal Press
Published quarterly by The Journal Press
Provincetown, Massachusetts, U. S. A.

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Single Numbers \$4.00

QUARTERLY
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Provincetown, Massachusetts

Entered as second-class matter, August 3, 1897, at the post-office at
Worcester, Mass., under the Act of March 3, 1879

Reentered as second-class matter, May 11, 1937, at the post-office at
Provincetown, Mass., under the Act of March 3, 1879

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EDITED BY

Carl Murchison

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GRADIENTS OF EFFECT*

Department of Education, Yale University

J. W. TILTON

A. INTRODUCTION

As used in this article, "effect" refers to the influence of rewarding and punishing, upon the tendency to make the response which immediately precedes the reward or punishment. The term, "gradients of effect," refers to the extension of that influence to earlier and subsequent responses. The use of these words does not imply the acceptance of any particular explanation of such influences.

It is with some hesitation that the writer presents gradients of effect, the determining points of which are based upon few more than 1,500 observations. When Brandt (1) concluded his summary statement, he pointed out that reliability can only be attained from many thousands of observations. But this study was not designed to add to the subject by reason of quantity. There are some questions which, perhaps, need not wait for very high reliability. At any rate, these questions need to be raised, and considered, before more exactness is sought from increase in quantity alone.

First there is a question as to the extent to which the backward gradient is a spurious function of a larger forward one, because of the usual method of assembling the data. The method is to include in the "one step before" calculations all such incorrect responses as are more than one step after another correct response. Accept for the moment, Thorndike's (11) zero of influence, namely the repetition of an incorrect response five or more steps from a correct one. Then the method should be to include in the "one step before" calculations, only such of those responses as are five or more steps from a correct one. Those which are two, three, and four steps *after* a correct response, introduce the influence of the forward gradient into the calculations of backward influence. In Figure 1, is an illustrated estimate in the dotted curve, of a backward gradient which might be entirely due to the forward gradient represented by the solid line curve, because of the usual method of assembling data. This method has not been used without excep-

*Received in the Editorial Office on March 26, 1943.

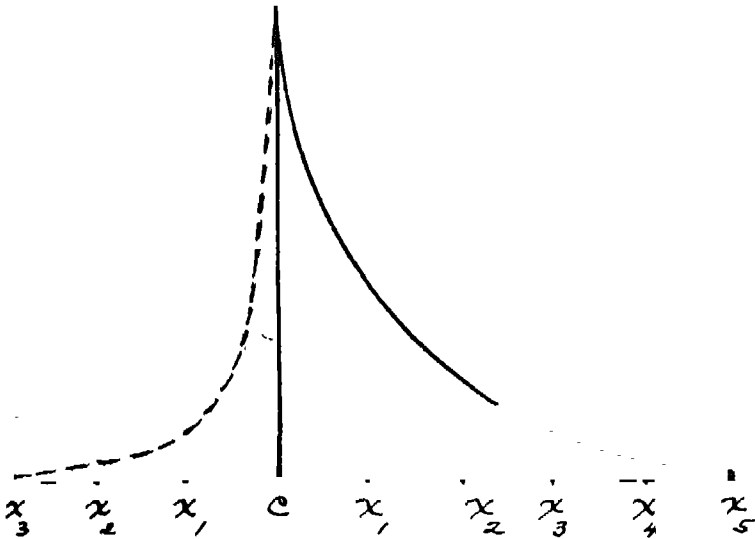


FIGURE 1

AN ESTIMATE OF A BACKWARD GRADIENT WHICH COULD BE CREATED SPURIOUSLY BY THE METHOD OF TAKING DATA FROM WITHIN A GIVEN FORWARD GRADIENT

tion. Muenzinger and Dove (9) have reported a backward gradient which cannot be attributed to a forward one, as has Farber (2). But for these data one might well have wondered whether there is a backward gradient. For, although Thorndike (11) reported the backward gradient as being 82 per cent of the forward one, Brandt (1) reported it as only 26 per cent of the latter. At any rate, if the criticism is valid, most of the gradient of effect data exaggerate the backward influence.

The second reason why there is need for more data on gradients of effect, is that almost all of the published data were collected to illustrate the influence of a correct response upon the repetition of neighboring incorrect responses. Only Muenzinger and Dove have reported backward and forward gradients of the influence of failure. Farber studied the influence of "wrong" upon neighboring "right" responses, but interpreted his data as not demonstrating a spread of influence. Later in this article, a condition will be described which could have prevented Farber from getting gradients such as Muenzinger and Dove reported. Nevertheless, the question remains: Does "wrong" influence neighboring "right" responses as "right" influences "wrong"? Muenzinger and Dove say the influence of a failure on neighboring successes is precisely the opposite of the influence of a success on neigh-

boring failures. The influences they describe are opposite, but to call them precisely opposite is to overlook a difference which raises an interesting question. Whereas a success seems to exercise more forward than backward influence, a failure seems to have more backward than forward influence. If the difference noted is a reliable one and to be found generally, it should be taken into account in framing explanatory hypotheses. The method used by Muenzinger and Dove in assembling data for their gradients from failure was not the "usual" one criticized in the preceding paragraph. If their data are in error it is for other reasons.

The third motivation for this study is the fact that none of the published data, either for success or failure gradients, were measured from an experimentally obtained zero or base-line. The importance of such a procedure will be discussed in the second section of the paper in connection with a description of the base-line for this study.

Measured from a known base, gradients from a success and from a failure will be presented in Section C. In Section D, an explanatory concept is offered for consideration. Section E is a brief summary.

B. THE BASE-LINE FOR GRADIENTS OF EFFECT

In writing, in the introductory section, that none of the published data were measured from an experimentally obtained base-line, the writer may seem to have been ignorant of Thorndike's (11) procedure, also followed by Brandt. Thorndike speaks of having used an experimentally obtained base-line (p. 50), but what he determined was a point. What is needed is an experimentally determined line. Why is a line needed and what kind of a line is needed?

It has been commonly reported for human serial learning that there is a backward and forward elimination of errors. The data are reviewed by McGeoch (8, pp. 97-108) under the title *Learning as a function of serial position*. The rote-learning data are referred to by Hull *et al* (5), under Theorem XXI, Corollary 6, p. 182. What is the relation of these serial position curves to gradients of effect within them? The answer may be obtained from the hypothetical curve of error in Figure 2. The answer is, that it depends on the method employed in assembling data. Take two procedures (a) and (b). In (a), responses to items 5, 13, and 21 are called correct, all others, wrong. What is true of the composite gradients from C_5 , C_{13} and C_{21} merely because of the curve of error? Incorrect responses close before and after a correct response will be shown to be repeated more often than will those farther away. If the C 's had no influence on the neigh-

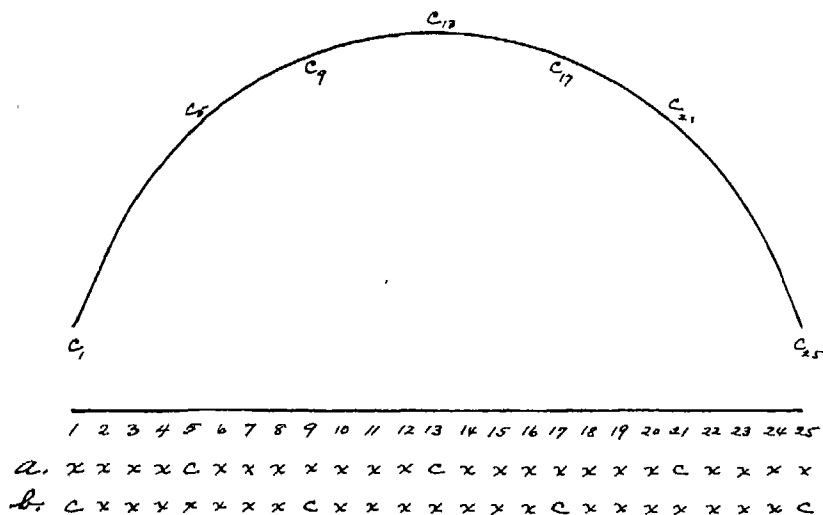


FIGURE 2

A HYPOTHETICAL CURVE OF ERROR IN WHICH GRADIENTS OF EFFECT ARE TO BE STUDIED

boring x 's, gradients would be reported nevertheless. If they exercised such an influence, the gradients would be exaggerated. In case (b) the situation is reversed.

• In the case of gradients of influence from a failure upon neighboring successes, the relation cannot be illustrated with Figure 2. The curve of repetition for successes is a reverse of the curve of error, as is illustrated in Figure 3 from some of the data of this study.¹ Suppose that failures are located on the serial position curve of success, shown in Figure 3, where successes were in Figure 2. Composite gradients from Failures 5, 13, and 21 would be shown if none existed. They would be exaggerated, if present. In the composite from Failures 1, 9, 17, and 25, the true gradients would be minimized or cancelled.²

¹It may not be inferred from these curves that repetition at initial and terminal points was equal, contrary to Hull, *et al*, (5) Theorem XXII, Corollary 6. Both initial and terminal points are plotted from initial and terminal averages.

²It was this possibility that was referred to in the introduction in reference to Farber's data. It might seem idle to suggest this as a possible explanation of lack of "spread" when Farber had concluded that "wrong" exercised no weakening influence. But in this, Farber seems to have been in error. He drew his conclusion from the data on the persistence of the original responses through the six trials. Each time, he dropped from consideration the weaker responses, and reported the per cent of repetition for the more favored ones. He interpreted the increasing percentages found, as evidence that "wrong" was ineffective. To the writer, the

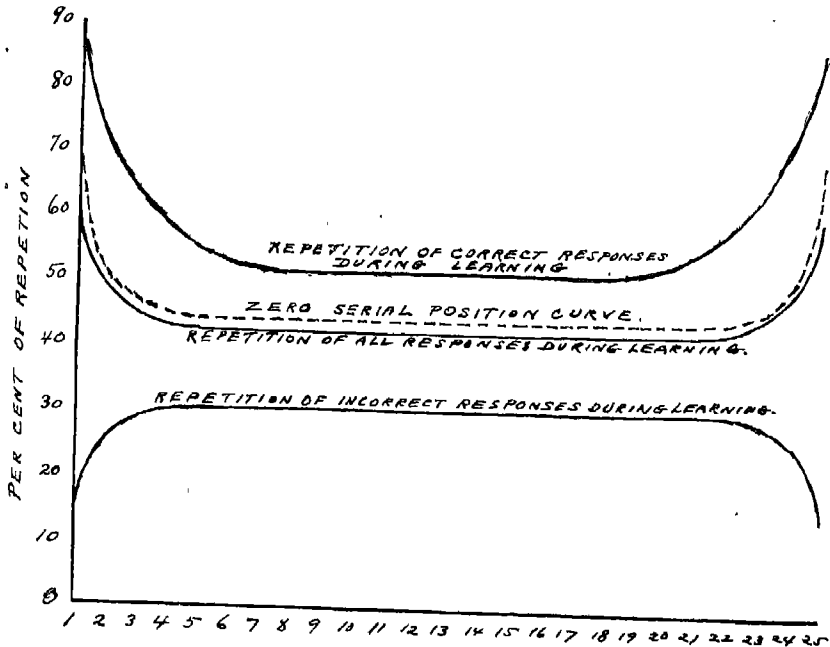


FIGURE 3

THE ZERO SERIAL POSITION CURVE AS RELATED TO OTHER SERIAL POSITION CURVES FOR THE SAME LEARNING MATERIAL

The nature of the error involved has been over-simplified because of the symmetry of the hypothetical curves used for illustrative purposes and the symmetrical location of the successes and failures on them. Another situation exists, when a single gradient (the goal gradient) may run throughout the data, as in the studies of Jenkins (7), and of Muenzinger, Dove, and Bernstone (10). Hooks, or reversals could be introduced into gradients of effect, on one side by the presence of single gradients of serial position, and into both the forward and backward arms by double gradients of serial position. It is not likely that the hooks in the curves published by Thorndike (11, 13) are of this origin. It is more likely that they are chance reversals. In fact, the position taken here, is not that published data *are* in error, but that there is a need for proof that they are *not* in error. Even though the goal gradient were itself thought of as being also a gradient of effect, a position taken by Muenzinger, Dove, and Bernstone, it is still neces-

only thing his increasing percentages illustrate about "punishment" is that the stronger the tendency toward a response, the more slowly punishment operates to change it.

sary to correct for it, in studying smaller gradients of effect within a larger one.

The serial position curve needed as a first step in this correction, is the repetition which obtains before the "rewards" and "punishments" to be studied are applied. Such a serial position curve for the data to be presented in the following section is plotted in Figure 4, Curve A.

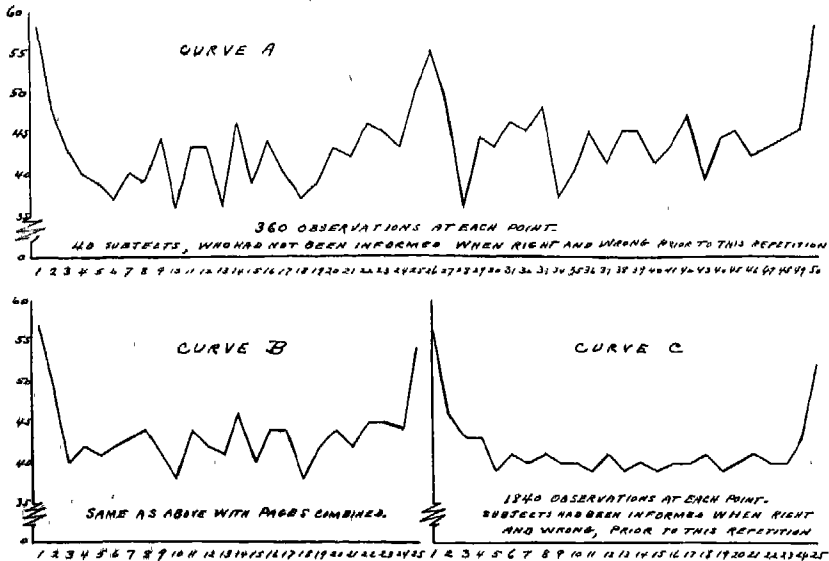


FIGURE 4
 ZERO SERIAL POSITION CURVE OF REPETITION

The relation of such a curve to other serial position curves was shown in Figure 3. Repetition of the responses for the first and second items was high. It was high again for the 25th item, which was located on the bottom of page one, and high for the 26th item which was located at the top of page two. Repetition was again high for the 50th and last item. The same results are shown in Figure 4, Curve B, with second-page results superimposed upon and averaged with first-page results. The first per cent of repetition is for Items 1 and 26, the last for Items 25 and 50. Curve C of Figure 4 shows what the zero serial position curve would have looked like with more reliability. It had been discovered in a preliminary examination of some of the data (all for which the test could be made) that the zero line for such data was very closely approximated by plotting percentages

of repetition during learning of rights and wrongs combined. This was illustrated in Figure 3. The number of rights was approximately equal to the number of wrongs. If this were not the case, the similarity could be expected only if the results for rights and wrongs were averaged with equal weights.

Finding a zero serial position curve which was straight and horizontal throughout most of its length, made possible a *very* simple solution to the problem of correction. Items 1, 2, 24, 25, 26, 27, 49, and 50 were not included in the gradients to be reported. Had the zero serial position curve of repetition been a curved line throughout, the writer would have felt it necessary to assemble a base-line by the same sampling of serial positions used in assembling the gradient data.³

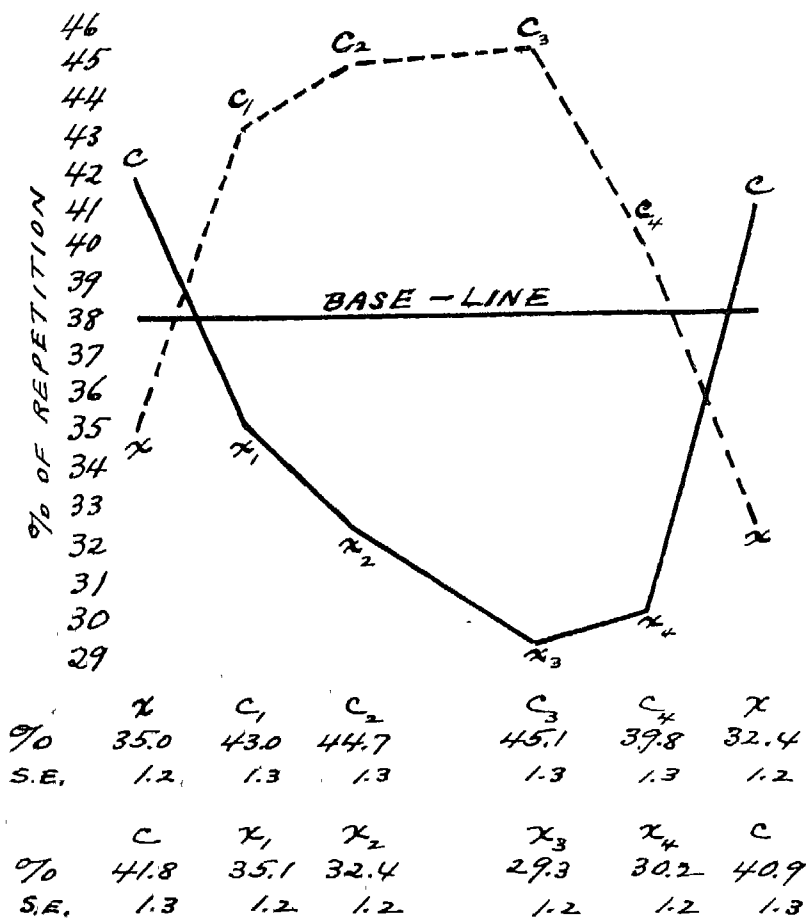
C. GRADIENTS OF EFFECT

The learning data for this study were obtained from the use of syllables in multiple-choice arrangement, four responses per stimulus. Six forms of 50 items each were made to be as nearly alike as possible. The subjects were 40 graduate and undergraduate students. The experimenter directed the subjects individually, from line to line, as regularly as possible, at a rate of about six seconds per line; and the exercise was repeated four or five times. The data have been analyzed (14) to make sure that both "right" and "wrong" contributed to learning. "Wrong" was found to have reduced repetition as much, if not more than "right" increased it. The difference was slight and attributed to a general interference with some repetitive habits to which reference will be made in the next section of this report.

The data for the gradients are in Tables 1 and 2. Table 1 is to be read as follows. There were 1,154 series of two wrongs preceded and followed by a right. Of the 1,154 series, CXXC, 510 of the preceding rights were repeated, and 506 of the following rights. Of the wrongs themselves, 401 of the first, and 388 of the second were repeated. The percentages of repetition are in the order just mentioned 44.2 and 43.8 for the rights and 34.7 and 33.6 for the wrongs. Table 2 is to be read in similar fashion for series of rights between two wrongs.

The data in Table 1 show clearly that the backward gradient is short.

³Securing a valid base-line for gradients of effect, might in certain cases, prove to be even more troublesome. If the serial position curve changed its shape in the course of the collection of data, collection of data for the base-line would need to parallel the collection for the gradients from trials as well as from positions. Such a case would be a shift from the backward elimination of errors, to backward and forward elimination, such as was found by Hill (4).



BASE FOR EACH POINT
 IN FAILURE GRADIENTS = 1527
 IN SUCCESS GRADIENTS = 1513

FIGURE 5
 GRADIENTS OF EFFECT

Averages of all of the data classified as early, central, and late repetition, however selected, would show no backward gradient. If the composite curve is to show the backward gradient, the one-step-before data, and the two-steps-before data must be reported alone and unaffected by the data in other locations. It is also evident that this short gradient would be exaggerated, as anticipated (see Section A) if the two-in-a-series data are allowed to contribute to the composite. They would raise the location of the one-step-before point while contributing nothing to other points. With these facts in mind, data were combined to show composite gradients. They are represented graphically in Figure 5. In assembling the composites, data for "two in the series" were not used. All the other series contributed, *with equal weight at each plotted point*. The four plotted intermediate points are, in order, the first step after, the second step after, the second step before and the first step before the event which is supposed to influence them. Data for other points are not included. The second step after was found to be on the average one and two-thirds steps removed from the second step before, and they are so plotted. The straight horizontal base-line is included⁴ so that the influence of "right" and "wrong" may be seen in truer perspective.

At this point, the need for great masses of data becomes apparent. For the preparation of these curves, the entire base was 40,000. That is, there were 40,000 opportunities for repetition. The base for each point in the XCCCCX curve is 1,527, and the base for each point in the CXXXXC curve is 1,513. Still, as to the shape of the gradients it may be said reliably (3 times the standard error) only that C_4 is lower than C_2 and C_3 (5.1 ± 1.6) and that X_1 is higher than X_3 (5.8 ± 1.7). The data strongly suggest, but not as clearly as the Muenzinger and Dove data do, that of the failure gradients, the backward one is the more pronounced, while the forward gradient is the more pronounced in the case of a success. This point will be raised again in the following section. Taking the curves at their face value, one would conclude that there is a double gradient of effect, both from success and from failure.

D. INTERPRETIVE COMMENT

Two explanatory concepts were offered by Thorndike (11). The first, he called the "scatter" hypothesis. The word was used to suggest that a "confirmatory reaction" to the satisfier may not always coincide with the unit of behavior it was meant to influence. The concept is essentially one of

⁴With the minus correction suggested by the earlier analysis (14) p. 112.

poor aims, like the scattering of shots from the bull's eye. This hypothesis is not supported in the results of an experiment reported by Muenzinger and Dove. They planned this experiment so that there was no uncertainty as to which the successful responses were. They had these responses thoroughly learned beforehand. Uncertainty was eliminated, but the gradients remained.

Thorndike called the other concept, the "spread" hypothesis. It attributes the gradients to a supposed physiological phenomenon of diffusion characteristic of the "confirmatory reaction." Apparently Thorndike favored this spread hypothesis since he is more apt to speak of the phenomenon as spread (12, 13, p. 34). It is quite clear that Brandt (p. 44) thought of the gradients as the product of a physiological phenomenon.

In the course of the analysis of the data for this study, the writer has been impressed with the explanatory possibilities of a third concept, a statistical rather than a physiological one, but not the "scatter" hypothesis. In the original records for the parts of the experiment when the subjects were not told when right nor when wrong, the writer noticed occasionally a fairly long series of unbroken repetitions. The instructions to the subjects had invited attention to individual syllables, but in spite of these instructions, some subjects were obviously patterning their way through the exercise and repeating blocks of the pattern. An examination of the data showed that there were individual differences in the size of the blocks repeated which were reliable. There was a correlation of .72 between halves of the data. It was concluded that there were *units of response in these data* other than the obvious 25 items per page, and that these other units were by no means equal. Such blocks of repetition were the exception rather than the rule. Most repetitions were single syllables. The frequencies decreased with the size of the block repeated. There were very few blocks of more than five syllables. If it be granted that often a subject's response to Stimulus X is Response $X \rightarrow (X + 1)$, occasionally it is Response $X \rightarrow (X + 1) \rightarrow (X + 2)$, and still less frequently it is a sequence of four of what the experimenter calls unit responses, then "gradients" should appear in the data because of these unit sequences.

This hypothesis is called a statistical one, because a gradient is thought of as a function of the decreasing frequencies with which the larger units of behavior may be expected to occur. It carries with it no particular theory of confirmatory reaction, or reinforcement, or inhibition. The same process, whatever it is, which is responsible for the modification of a response tendency in success and failure, is assumed to apply to all of the units of

behavior, those the experimenter has defined, and the hypothetical units of varying size and frequency.

This concept is not one of "completeness" of response; it is one of *sequential* unity. Nor is it a gestalt explanation. One may or may not think the units postulated are basic, requiring no explanation in terms of smaller units. This may be said, because it seems quite plausible within a "mechanistic" theory, to suppose that such sequences of two, three, four or more response syllables could have acquired such unity prior to the application of "right" and "wrong" as to permit of their being reinforced or weakened as wholes.⁵

Such an explanation is gratuitous, if gradients of effect may be explained as functions of time intervals as suggested by Hunter (6). But Thorndike (11), Brandt, and Grice (3) are inclined to think of the gradients as more closely related to the intervening steps or activities than to the elapsed time. That gradients have been demonstrated by Thorndike when the connections were "irrelevant to the learner's purposes" does not invalidate the hypothesis of sequential unification. The sequential unity discovered in the writer's data would not have been predicted from the learner's purposes, as these purposes might have been defined from the experimental instructions. Furthermore, the hypothesis may be reconciled with the contrast already mentioned, of a larger backward gradient from a failure on the one hand, and a larger forward one from a success on the other. All that is needed to reconcile them is to assume that a correct response would initiate and project into the series more unit sequences than would be initiated by an incorrect one.

The hypothesis should be tested by series of experiments in which the only variable is the median length of these supposed units. The longer the units, the longer and more pronounced the gradients should be. If the data being described had been more extensive, a controlled analysis would have

⁵Just before this paper was written, Thorndike's *Experimental study of Rewards* was re-read, and two sentences noticed which had not been noticed before. He wrote, p. 54, "the extent of spread may vary with the kinds of learning and the learners. — We cannot distinguish surely between a genuine gradual weakening of the influence with remoteness, and a possible mixture of individuals in whom the influence spreads to different extents stopping abruptly in each."

This hypothesis of Thorndike's is similar in a way to the one offered by the writer. In both cases the gradient is considered as a function of a frequency distribution. The difference is that Thorndike seems to have been thinking of *individual* differences in a physiological process, namely, the diffusion of the confirmatory reaction; where in the hypothesis offered by the writer, *individual* differences are not of key importance. The important differences are in the *sequential* size of response "units."

been made. Groups would have been selected to vary in the amount of repetition of sequences of syllables, under zero conditions. At the same time, the groups would have been equated so that "right" and "wrong" were equally influential on isolated responses. This was impossible. The best that could be done was to divide the group into three sub-groups varying as desired, but undoubtedly varying also, as to the effect of "right" and "wrong" on single-step responses. This was done, and the results are shown graphically in Figure 6 for large-unit, medium-unit, and small-unit groups.

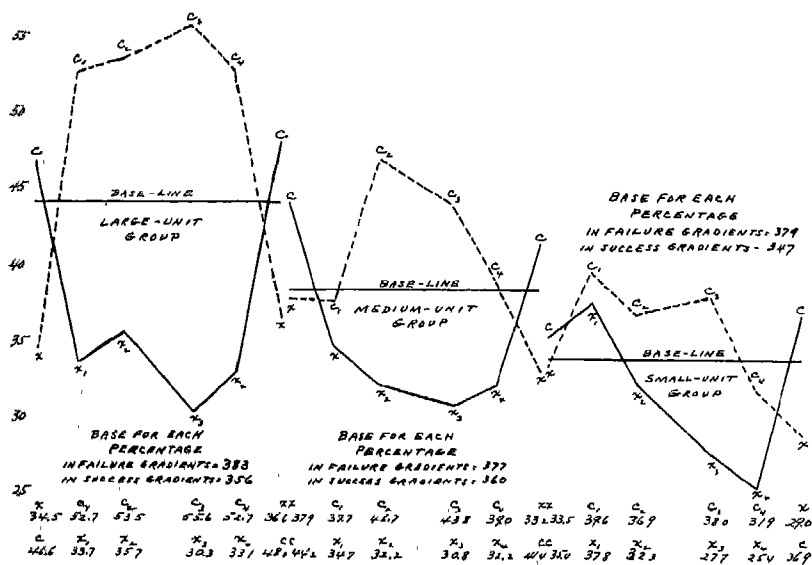


FIGURE 6
GRADIENTS OF EFFECT FOR SUB-GROUPS

Data were assembled as for Figure 5. The records of 10 subjects are in each group.⁶

The results raise more questions than they answer. In the small-unit group results, the downward slope of the X's may not be attributed to chance. From X_1 and X_2 combined to X_3 and X_4 combined, or from X_1 to X_4 it is statistically significant. The downward trend of the C's is almost significant. It does not seem reasonable to think of these slopes as gradients

⁶The records of 10 subjects had to be discarded because it was thought to be necessary or at least advisable to have each of the three groups equally and similarly represented by what were called in the earlier report, Groups I and II (14, pp. 103-106).

of effect. This group just manages to show a reliable difference between the repetitions of "rights" and the repetitions of "wrongs." There is no evidence of a backward gradient from C , yet the forward gradient is more pronounced. There is no evidence of a forward gradient from X , yet there is more slope, which under other circumstances might be called a backward gradient from X . Could there be a lowering of repetition of both uninterrupted C 's and X 's, because of monotony? Or, if the apparent slope of the C 's is a chance result, might not a series of "wrongs" become increasingly effective? But if this explains the downward slope of X 's for the small-unit group, why wouldn't it be a plausible explanation of the rising C 's of the large-unit group, that repeated C 's for them, become more effective just as repeated X 's do? If, for this group, an unbroken series of C 's and of X 's becomes more effective, then the drop from C_3 to C_4 and the rise from X_3 to X_4 would remain, as backward gradients of effect, even more pronounced than if measured from a horizontal line.

If the results were available for only the large-unit group, the conclusion would probably be drawn that gradients of effect are double, and those of failure are equal and opposite to those of success. But the results for the small-unit group should be kept in mind. Its slope from upper left to lower right is evident for the medium-unit group also. This slope is a challenge, and a strong suggestion, that other factors than "effect" have operated to produce the curves like those presented earlier in Figure 5. The breakdown of the data does not, of course, prove the applicability of the hypothesis which prompted it. Nor does it disapprove it, for there is more certain evidence of gradients of *effect* in the high group data, as would be predicted from the hypothesis.

E. SUMMARY

The usual method of collecting and assembling data for gradients of effect is criticized in two respects. First, it includes in the smaller gradient, data from within the influence of the larger gradient. The result is an exaggerated smaller gradient. Second, in the measurement of gradients, no steps have been taken to find to what extent large serial position gradients may have existed prior to the introduction of the success and failure which are to produce the gradients to be measured. The nature and magnitude of the errors introduced by uncontrolled serial position gradients could vary a great deal. With an attempt to overcome these faults, gradients from success and from failure are presented from original data.

There is offered for consideration, a hypothetical explanation of gradients of effect as a function of the frequency with which it happens in the learning

exercise, that responses in sequence, thought of by the experimenter as discrete, are sufficiently unified to permit of their being affected by success or failure as unit responses. A break-up of data designed to test the hypothesis in a preliminary way, was not altogether inconsistent with the predictions.

The break-up was more interesting, however, as suggesting that the gradients are not the result of "effect" alone. Without this analysis, it would have been concluded that the gradients of effect are double for both success and failure; but that they are not precisely opposite. From a success, the forward gradient is the larger, from a failure the backward gradient is the larger. But, with all the data in mind, it seems quite likely that other factors than "effect" are responsible for the supposed success and failure gradients not being more symmetrically opposite. Also to the writer, there seems to be more certainty of the so-called backward gradients being due to "effect" than there is in the case of the so-called forward gradients.

From a single learning exercise and a common procedure, three groups showed differences in gradient pattern which are not simply differences in amount. The study began with the freeing of gradients of effect from the influence of one kind of serial position gradient, and ends with the suggestion that another kind of serial position gradient may have to be isolated.

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A FOLLOW-UP STUDY OF CHILDREN IN ADOPTIVE HOMES*

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Reports on the first units (27, 32) of a long-time study of the mental development of children placed in adoptive homes aroused considerable interest. It seems appropriate therefore to report on the intellectual status of this group of children during the early school years when mental tests are subjected to less criticism than during the preschool ages.

The 139 subjects of this study were placed in adoptive homes at a mean age of three months by two child-care organizations in Iowa. All children were under six months of age when placed. Following at least a year's residence in the homes, the children, at a mean age of two years, were given intelligence tests using the Kuhlmann Revision of the Binet Scale. Two years later they were retested with the 1916 Stanford-Binet. At a mean age of seven they were given a third examination, again with the 1916 Stanford to avoid the introduction of difficulties in certain longitudinal comparisons. These children constitute the majority of a group who were legally available for adoption between specified dates. Evidence cited later shows that they are representative of the total group. Ninety-five per cent of the children were illegitimate and the family histories, full of records of dependency and social inadequacy, indicated below average social and economic status for the true parents. In intelligence the mothers who were tested ranged from 50 to 126 in *IQ* with a mean of 86, standard deviation of 15. The mean education reported by the mothers was the equivalent of tenth grade, ranging from third grade to the last year of college. The reported education of the fathers also averaged tenth grade. In both cases there was sufficient evidence (to be discussed later) to conclude that these figures do not represent the actual achievements of the true parents. The occupational status of the true fathers was 6.4 on a seven-point classification or equal to slightly skilled labor (15). Sixty-two per cent of the fathers were in the slightly skilled and unskilled groups. The mean for the general population was 4.8,

*Accepted for publication by George D. Stoddard of the Editorial Board, and received in the Editorial Office on April 12, 1943.

indicating this particular group of men to be well below the average in occupational status (see Table 4).

In contrast to their true family backgrounds the children were placed in foster homes selected for economic security, emotional warmth, and general desirability for child rearing. The mean education for both foster parents was equal to high school graduation, with 12 per cent having had some college work. The average occupational level of the fathers was 2.8, or two steps above the mean for the general population and 3.6 steps above the mean for the true fathers.

It is recognized that such measures for the parents as grade reached in school and occupational classification are crude indices of ability and achievement against which to compare mental test results of children. These measures, nevertheless, are the best now available for quantifying individual differences in intellectual attainment among these adults, and are used for both true and foster parents.

Intelligence tests are available for 88 out of the 139 mothers and 12 of the fathers but for none of the foster parents.

THE MENTAL DEVELOPMENT OF THE CHILDREN

All the children were given three examinations, and a few, for various reasons, had been given four and five. The mean age at first test was *2 years, 2.5 months*, at the second test *4 years, 4 months*, and third test *7 years, .7 month*. In those cases where more than three tests had been given, tests falling nearest the mean age for the group were used in the major comparisons. The interval between tests, therefore, was slightly over two years, eliminating the effects of practice or memory for specific items. See Table 1 for distribution of the ages at tests used in this study.

The mean *IQ*'s were 116 on first test, 112 on second test, and 113 on the third test. Table 2 shows the distribution of *IQ*'s on the three test series. The standard deviation remained essentially the same throughout this period. The range was from 80 to 156 on all three tests. At a mean age of seven years, no child is below 80 in *IQ*, and only 6 of the 139 are below 90. In contrast there are 83 (60 per cent) with *IQ*'s above 110.

All retests were given by the authors, the first author giving the majority. Relationships between examiners and foster homes are most cordial and both parties look forward to the periodic examinations as an opportunity to renew pleasant friendships.

Qualitatively the test responses are what would be expected of children of these mental age levels. There is no indication thus far of deterioration or

TABLE 1
AGE DISTRIBUTION AT TIME OF TEST OF CHILDREN IN CONTINUOUS STUDY

Chronological age				First test	Second test	Third test
Years	Years	Months	Months			
0	6	to	0	11		
1	0	to	1	11		
2	0	to	2	11		
3	0	to	3	11		
4	0	to	4	11		
5	0	to	5	11		
6	0	to	6	11		
7	0	to	7	11		
8	0	to	8	11		
9	0	to	9	11		
10	0	to	10	11		
11	0	to	11	11		
12	0	to	12	11		
Number				139	139	139
Mean				2 years, 25 months	4 years, 4 months	7 years, .7 months
Median				1 year, 9 months	4 years, 1 month	6 years, 7 months
SD (months)				17.5	17.8	19.2

TABLE 2
IQ DISTRIBUTION OF TESTS OF CHILDREN IN CONTINUOUS STUDY

IQ	First test	Second test	Third test
155-159			1
150-154	1		0
145-149	0	1	2
140-144	5	2	3
135-139	6	1	3
130-134	6	3	3
125-129	20	9	3
120-124	19	7	17
115-119	20	11	8
110-114	17	11	21
105-109	13	31	25
100-104	12	21	21
95- 99	12	20	15
90- 94	12	8	10
85- 89	3	9	4
80- 84	2	4	5
	3	1	1
Number	139	139	139
Mean	115.5	111.5	113.1
Median	116.3	110.5	112.1
Standard deviation	13.9	13.3	13.5

onsistent deceleration in rate of growth. These children who, in spite of their lowly true family histories, have shown consistently above average levelopment have now reached the age when the validity of intelligence tests s least questioned. The group still maintains essentially the same mean *IQ* obtained during their preschool years.

The graphic presentation of the test distributions shows clearly the over-all superiority of these foster children to children in general as represented by the Terman Merrill L-M standardization group (Figure 1).

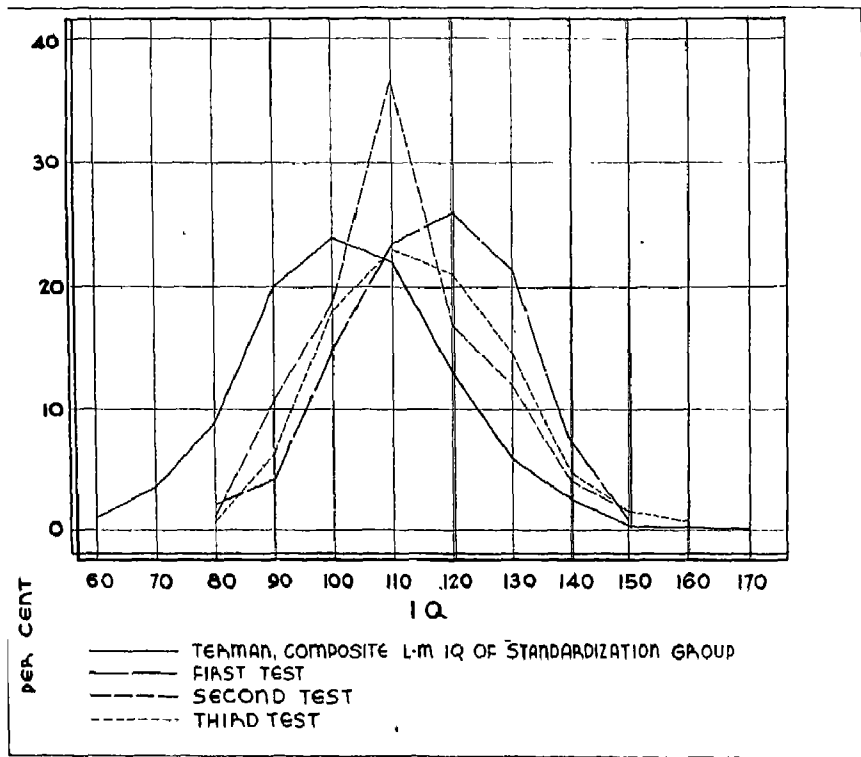


FIGURE 1

DISTRIBUTION OF *IQ*'s ON FIRST, SECOND, AND THIRD TESTS COMPARED TO COMPOSITE L-M *IQ* OF STANDARDIZATION GROUP

The greater stability between second and third tests, as compared to first and second tests is reflected not only in the smaller changes between the means for the second and third series but is shown in the correlations between successive tests as well.

Between 1st and 2nd test $r = .52 \pm .04$

Between 1st and 3rd test $r = .43 \pm .05$

Between 2nd and 3rd test $r = .72 \pm .03$

These correlations are substantially the same as those reported in other studies of retests of young children. There is no indication that the *IQ*'s of foster children who remain in the same adoptive homes show either greater or less variability than do those of children of the same ages living in their own homes.

The consistency of the mean *IQ* over these childhood years gives an impression of the stability of individual *IQ*'s which is quite misleading. Reference to the correlation coefficients as well as to the distribution of *IQ*'s shows that fluctuation continues over this period. As a group these children remain superior, but they do not maintain an invariable relationship to each other on repeated tests.

The changes in *IQ* decreased in amplitude, however, as shown in Table 3.

TABLE 3
CHANGES IN *IQ* BETWEEN SUCCESSIVE TESTS

	Between Tests 1 and 2		Between Tests 2 and 3		Between Tests 1 and 3	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
+36 to +40					2	1.4
+26 to +35	1	0.7	4	2.9	2	1.4
+16 to +25	10	7.2	10	7.2	7	5.0
+ 6 to +15	17	12.2	32	23.0	27	19.4
— 5 to + 5	50	36.0	63	45.3	44	31.7
— 6 to —15	33	23.7	26	18.7	35	25.2
—16 to —25	22	15.8	4	2.9	14	10.1
—26 to —35	4	2.9			6	4.3
—36 to —45	1	0.7			2	1.4
—46 to —50	1	0.7				
Total	139	99.9	139	100.0	139	99.9

Thirty-six per cent of the children changed five points or less between first and second tests while 45 per cent showed a change of five points or less between second and third tests. This same trend is shown by the fact that 28 per cent gained or lost over 16 points between first and second tests while only 13 per cent showed this much change between second and third tests.

There was one child who lost more than 20 points and five who gained 20 or more in the two-year period between second and third tests. Some of the large changes between first and second tests were canceled by changes in the

opposite direction on the third test, while in other cases there were accumulated changes as the third column of the table indicates.

The tests were also distributed according to nearest year of age at time of test. It is now possible to plot the trend of mean *IQ*'s for these 139 children through the 8th year as shown in Table 4.

TABLE 4
IQ DISTRIBUTION BY AGE AT TEST FOR 139 CHILDREN

<i>IQ</i>	Age—years							
	1	2	3	4	5	6	7	8
155 to 159							1	
150 to 154		1		1				
145 to 149			1	1		2		
140 to 144	5	1	1	1		3		
135 to 139	4	3	1	2	1		1	1
130 to 134	6	3	4	5	1	2	2	
125 to 129	14	6	2	5	3	8	4	1
120 to 124	10	7	7	3	8	5	1	1
115 to 119	5	11	6	8	4	8	5	7
110 to 114	9	12	12	8	8	12	8	5
105 to 109	9	5	5	7	7	12	5	3
100 to 104	5	8	2	10	2	10	5	1
95 to 99	2	5	7	3	4	2	1	3
90 to 94	1	2		5	3		4	1
85 to 89			2	2	1	3	1	1
80 to 84			2	1		1		
75 to 79				1				
Number	70	64	52	63	42	68	38	24
Mean	120	115	113	112	112	114	112	111
Median	121	115	113	111	112	112	111	113
Standard deviation	12.4	12.6	14.3	15.8	11.7	13.7	14.2	11.1

The number of cases range from 70 at one year to 24 at eight years. Within these ages every test for each child was included in order to obtain a repeated cross-section of the available results at as many points as possible. Seventeen children are represented twice since their third test was given at nine years of age or older. Ninety-eight are represented three times, 23 four times, and one child five times. Each year presents a sampling drawn from the total group of 139, and does not represent a group made up of the same individuals from year to year. Under these circumstances the statistical significance of the differences from year to year cannot be computed.

It is noteworthy that over the period from three through eight years of age the mean *IQ* of this group has not varied over three points, and has consistently remained in the above average classification. The explanation for the unusually high mean secured on this group of children tested during

their first year may be due to several factors. Faulty standardization of the tests, and various defects of infant scales are possible causes frequently mentioned. There are, however, certain other subtle factors which must not be ignored. During the first and second years of life, a child's development is significantly influenced by the amount of physical attention, love, and security with which he is surrounded. Characteristically, adoptive homes have these to offer in abundance. Relatively simple experiences (30) are stimulating at these ages and are probably present in all adoptive homes to a high degree. Not all homes, however, can maintain a highly stimulating environment as the child grows older and as the nature of his needs changes. The two-year-old, and increasingly the three-year-old, seeks independence and information. The foster parents are not always as well prepared to answer questions as they were to give physical security. These dynamic factors are, unfortunately, not adequately reflected by educational attainment, occupational status, or other measures of home environments now available.

Figure 2 shows the general trend in mean *IQ's* over this eight-year age

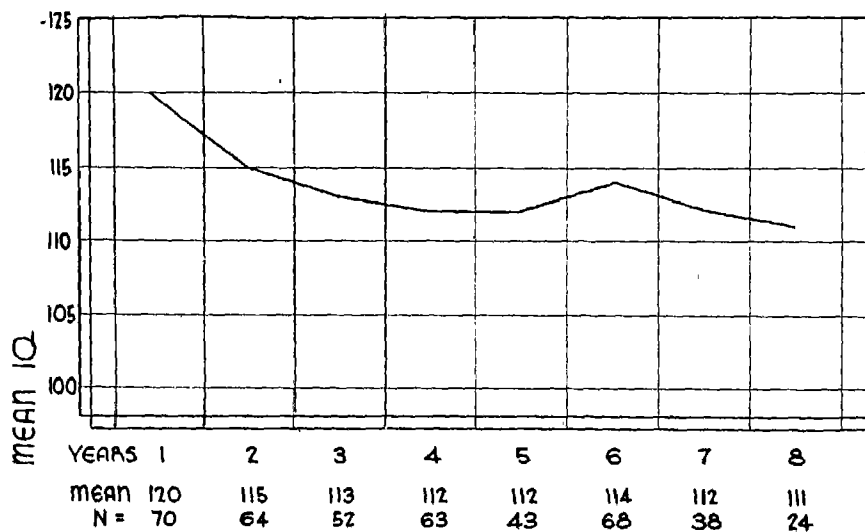


FIGURE 2
MEAN *IQ's* AT AGES 1-8

range. It is evident that the high mean attained by children tested at one year of age is not duplicated again although these same children make up the majority of the groups at four and six years.

It may be concluded that through the late preschool and early school

years there has been an increasing stability of the mean *IQ* of this group. The mean has been consistently above average. Large individual fluctuations in *IQ* continue to be found from test to test.

RELATIONSHIPS BETWEEN MENTAL DEVELOPMENT OF ADOPTED CHILDREN AND CHARACTERISTICS OF THEIR FOSTER PARENTS

1. Occupational Level

The relative concentration of the foster homes in the upper occupational categories, and within the upper levels of these groupings, has been discussed in earlier publications (27, 32). Table 5 shows the occupational distribution

TABLE 5
DISTRIBUTION OF TRUE AND FOSTER FATHER OCCUPATION

Occupational classification	General population employed Males, 1930	True fathers		Foster fathers	
	Per cent	Number	Per cent	Number	Per cent
I. Professional	3.1	2	2.0	19	13.7
II. Semiprofessional and managerial	5.2	4	4.0	28	20.1
III. Skilled trades	15.0	15	15.2	34	24.5
IV. Farmers	15.3	5	5.1	38	27.3
V. Semiskilled	30.6	12	12.1	12	8.6
VI. Slightly skilled	11.3	12	12.1	6	4.3
VII. Day laborers	19.5	49	49.5	2	1.4
Number		99		139	
Mean	4.8	6.4		2.8	
Standard deviation	1.5	1.8		1.4	
Median	5	6		3	

of the general population, the true fathers, and the foster fathers. Data were available on 99 true fathers and all foster fathers. Comparisons between the development of children placed in homes in the upper three categories as well as the lower four therefore are not as significant as they might be were both samples drawn from the general population instead of one in which all tend to be selected from the upper levels of a total distribution.

Figure 3 shows the comparison between the means for the total group of 139, as well as the means by ages of those children placed in the upper three and in the lower four categories. There is a consistent difference between the two groups, which reaches its maximum at the four-year level. One interesting phenomenon is the approximation in the means of the two groups after the age of five, corresponding to enrollment in school. On the

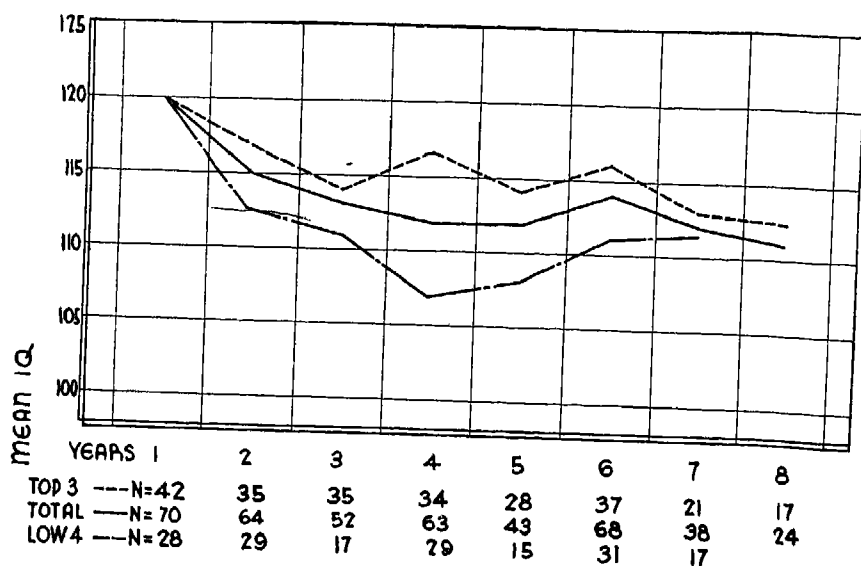


FIGURE 3

COMPARISON OF MEAN *IQ* AT AGES 1-8 FOR TOTAL GROUP AND GROUPS PLACED IN FOSTER HOMES IN UPPER THREE AND LOWER FOUR OCCUPATIONAL CATEGORIES

hypothesis that economically superior homes offer certain cultural and social advantages, it is reasonable to expect that children in these homes will maintain an early superiority in information, range of concepts, and intellectual initiative. On the other hand four- and five-year-old children in less privileged homes too often mark time awaiting public school entrance and visibly respond to the school environment which is stimulating for them. In the same environment the initially more superior children may suffer the "leveling" influence of instruction which fails to provide for their specific needs.

It may be concluded from these results that within the differences found in this selected group of foster homes, children in the relatively less privileged homes drop below those in more privileged groups during the late preschool years. In infancy, and after the beginning of school for the period covered by this report, there is a perceptible but not statistically significant difference in favor of the better homes. The means of all groups remain above the average for children in general.

2. Education

The foster parents are superior to the general population with regard to education as they were in occupational level. The mean and median edu-

cational attainment is high school graduation. There are few who completed less than the eighth grade and many who had work beyond high school (see Table 6).

TABLE 6
DISTRIBUTION OF TRUE AND FOSTER PARENT EDUCATION

School attainment	True fathers		True mothers		Foster fathers		Foster mothers	
	No.	%	No.	%	No.	%	No.	%
20					5	3.6		
19					3	2.2	3	2.2
18					7	5.1	0	0
17					3	2.2	1	.7
16	3	3.5	1	.8	11	8.0	15	10.9
15	1	1.2	0	0	8	5.8	8	5.8
14	4	4.7	4	3.1	4	2.9	14	10.1
13	5	5.9	11	8.5	14	10.1	21	15.2
12	23	27.1	33	25.6	24	17.4	29	21.0
11	8	9.4	12	9.3	4	2.9	6	4.4
10	4	4.7	13	10.1	7	5.1	13	9.4
9	7	8.2	12	9.3	10	7.2	4	2.9
8	18	21.2	27	20.9	35	25.4	18	13.0
7	7	8.2	11	8.5	2	1.5	4	2.9
6	2	2.4	3	2.3	0	0	1	.7
5	2	2.4	0	0	0	0	0	0
Less than 4	1	1.2	2	1.6	1	.7	1	.7
Unknown	54		10		1		1	
Number	85		129		138		138	
Mean	10.2		10.1		12.0		12.1	
Median	10.8		10.1		11.8		12.2	
Standard deviation	2.7		2.3		3.7		2.9	

Table 7 shows the relationships between the child's successive test scores and foster parent education.

TABLE 7

	Foster mother's education	Foster father's education	Mid-foster parent education
Child's first test	.06±.06	.06±.06	.07±.06
Child's second test	.17±.06	.11±.06	.15±.06
Child's third test	.20±.06*	.12±.06	.16±.06

*Reliable at the 5 per cent level of confidence (20, p. 212).

These correlations show a very modest increase over the six-year period and are similar in magnitude to correlations between child's *IQ* and foster parent education reported by Leahy (19) and Burks (6). Correlations between the same factors for children in their own homes are usually somewhat higher, ranging from .27 to .65 in various samplings (13, 38).

Other analyses by educational levels of the foster parents show the same slight positive relationship between child *IQ* and foster parent education. It must also be recalled that the selection of homes was influenced by the presence of certain positive dynamic values not necessarily reflected in educational or occupational levels.

It may be concluded that the foster parents are above the general average in education and occupational status and that the children are above the general average in intelligence. The range and level of child *IQ* is approximately what would be expected for children in own homes where the parents are like the foster parents in educational, economic, and social status.

3. *Selective Placement*

In a discussion of the relationship between the mental development of the children and various characteristics of their true and foster parents, it is necessary to investigate whether and to what extent selective placement occurred. If the children of brighter parents were placed in the more superior homes, there would tend to be a relationship between children and foster parents as a result of such a placing policy. Selective placement may also produce an artifact which appears to show a relationship between true parents and their children.

Results of the assortative placement of children with highly uniform true family backgrounds have been reported by Harms (16) and the results of completely unselected placement of children with varied family backgrounds are now being studied by Skeels.

The majority of the children in this study come from families with below average histories, and among these there was little possibility of selective placement. However, there were some whose background was comparatively outstanding either for superiority or inferiority and there was an understandable tendency on the part of the agencies to pay special attention to these children. The policy of completely unselected placement now followed by one of these agencies was not instituted until after 1938.

Correlations between measures for the true and the foster parents constitute one index of the extent of selective placement. The correlation coefficient between mother's *IQ* and mid-foster-parent education is .21 for the 88 cases where this information is available. When maternal *IQ*'s were available, they were considered in placement but the tested level of the mother was never the sole deciding factor. The correlation between true mother's education and mid-foster-parent education was .30. The general social histories are probably sufficiently reflected by education and *IQ* to con-

clude that a correlation between history and foster parent education would be similar in magnitude. Selective placement thus occurred but was neither marked nor invariable.

The relationship between mother's *IQ* and education and foster parent's occupational level is shown in Table 8.

TABLE 8

	I	Foster father's occupational classification					
		II	III	IV	V	VI	VII
		<i>IQ of mother</i>					
No. cases	13	17	18	26	9	3	2
Mean	88.2	90.2	83.3	84.1	82.6	82.6	77
<i>SD</i>	15.0	12.8	18.6	13.1	12.6		
Range	60-109	60-114	50-129	50-109	60-99	65-114	75-79
		<i>Education of mother</i>					
No. of cases	18	26	30	36	12	5	2
Mean	10.6	10.7	10.3	9.8	8.7	8.8	11
<i>SD</i>	2.0	2.3	2.1	2.6	1.7		
Range	7-14	4-14	6-13	4-16	7-12	8-12	10-12

While the mean *IQ*'s of mothers of children placed in the first two classifications are higher than for the remaining five, these differences between adjacent categories are not statistically significant when tested by the use of Fisher's *t* test. When the true mothers of children in Classes I and II (mean = 89.3) are compared with those in Classes III and IV (mean = 84.6), the difference is not reliable at the 5 per cent level of confidence.

Relationships between true and foster father occupations were not computed since 62 per cent of the true fathers were in the lowest two groupings and 58 per cent of the foster fathers were in the three highest groupings.

It is apparent both from the correlations and from the class-by-class comparisons between foster father occupation and true mother *IQ* and education that some selection occurred in which these characteristics played a part. It is also apparent that for the majority of the children there could be little selection both because of the concentration of true families at the lowest social levels and because of the disparity between the true and the foster families in social, educational, and economic status. The "best" foster home was far superior to the "best" true family history, the "worst" foster home ever so much better than the "worst" true family history. There was some overlapping between the two groups since the "best" true family was better than the "poorest" foster family on such criteria as education, occupation, and social status.

RELATIONSHIPS BETWEEN THE MENTAL DEVELOPMENT OF FOSTER CHILDREN AND CHARACTERISTICS OF THEIR TRUE PARENTS

1. *Intelligence*

Of all the comparisons it is possible to make, probably the most interesting are those between the intelligence test scores of the true mothers and their children. Intelligence test results were available for 88 of the 139 mothers. Eighty were based on the 1916 Stanford-Binet and five on the Otis Self-Administering Tests. One, a resident in an institution for the mentally defective, had an *IQ* of 63 on the 1911 Goddard revision of the Binet; one, a resident of a state hospital with a diagnosis of "psychosis with mental defect," had an *IQ* of 63 on the Wechsler-Bellevue; and one, a self-supporting high school graduate had an *IQ* of 128 on the Terman Group Test. Since these scores were representative of classifications which would be expected on the Stanford-Binet, they were included in the analysis (Table 9).

TABLE 9
DISTRIBUTION OF TRUE MOTHER'S *IQ*

120-129	1
110-119	2
100-109	13
90- 99	25
80- 89	15
70- 79	16
60- 69	14
50- 59	2
Number	88
Mean	85.8
<i>SD</i>	15.1
Median	87.5

The preponderance of *IQ*'s below 100 is evident. Only three, or 3 per cent, were above 110, while 22, or 25 per cent, were below 80 *IQ*.

The tests were given by trained, experienced examiners under ordinary testing conditions. There was no evidence of unusual emotional tension during the test. The decision to release the baby for adoption was usually made before the test was given. In any event the girl's score did not determine whether or not she retained the child. The girls considered the mental test as part of the routine of being in the hospital and planning for the child. Examinations were not made when the mother was obviously ill or weak. In the absence of research which would conclusively indicate the superiority of other than 16 years as the maximum divisor with the 1916 Stanford-Binet, the test author's directions were followed in the computation of the *IQ*'s.

Comparisons between the *IQ*'s of children whose mothers' *IQ*'s are known, and those whose *IQ*'s are unknown are given in Table 10.

TABLE 10

	Child's first test		Child's second test		Child's third test	
	Mother <i>IQ</i> known	Mother <i>IQ</i> unknown	Mother <i>IQ</i> known	Mother <i>IQ</i> unknown	Mother <i>IQ</i> known	Mother <i>IQ</i> unknown
Mean	114	118	111	113	113	113
SD	14.2	13.1	12.7	14.2	13.1	14.1
Median	115	118	110	112	112	112
Number	88	51	88	51	88	51

None of the differences between pairs of data are statistically significant or of great magnitude. All the means are in the above average classification. Presumably the relationship between the mentality of children and that of their mothers, where the maternal *IQ* is unknown, is the same as that where the maternal *IQ* is known. Conclusions based on the tested sub-group are therefore applicable to the total group.

Comparison between the distribution of the mothers' *IQ*'s and the third

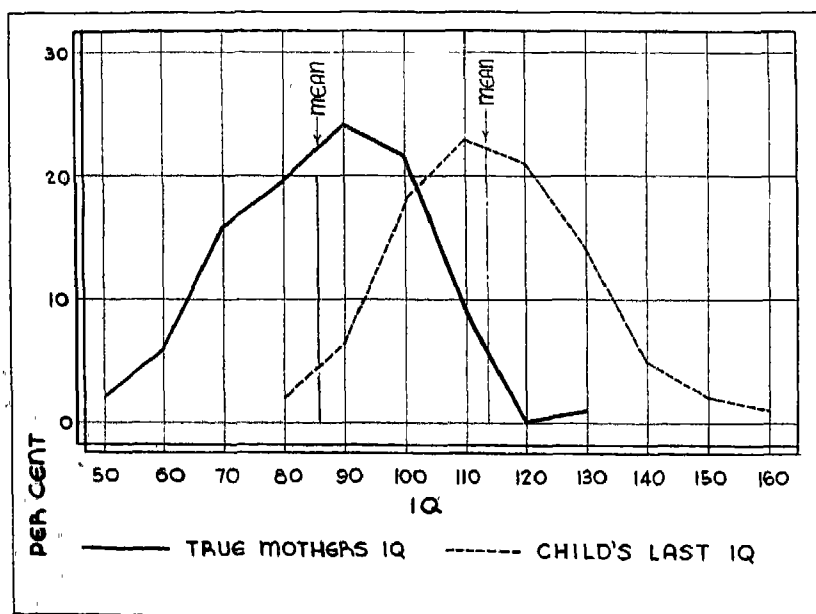


FIGURE 4

COMPARISON BETWEEN DISTRIBUTION OF TRUE-MOTHER *IQ* AND CHILD *IQ* ON LAST TEST

tests of the children (Figure 4) shows the consistent superiority of the offspring. There is a difference of 26 points between the means for the mothers and their children.

The relationships between mother-child pairs, expressed in terms of correlation coefficients are given in Table 11.

TABLE 11
CHILD'S *IQ* AND TRUE MOTHER'S *IQ*

First test	.04±.07
Second test	.25±.07*
Third test	.36±.07**

*Reliable at the 5 per cent level of confidence (20, p. 212).

**Reliable at the 1 per cent level of confidence (*Ibid.*).

In view of the fact that a positive correlation exists between data for true and foster families, it is to be expected that correlations between child's *IQ* and data for either true or foster parents would also be positive. That both of these sets of correlations are positive and both are small is not argument in favor of the "influence" of either foster or true family characteristics. Correlational studies, however, do not throw light on the disparity between the means and the ranges of the distributions of the mother and child *IQ*'s. The difference, amounting to the difference between a classification of "dull normal" for the mothers and "above average" for the children remains statistically significant and socially important.

If intelligence test data on the foster mothers were available, it would be possible to make direct comparisons between data for true and foster mothers and the children. Lacking *IQ*'s for the foster mothers, it is possible to draw only those inferences which can be based on data common to both true and foster parents.

2. Occupation

Since three-fourths of the true fathers of the children were in occupational classifications described as semi-skilled, slightly skilled, and unskilled, there was little value in making a detailed analysis on the basis of occupational level. Essentially the results remain the same as in a previous report in which no relationship between true-father occupation and child's mental development was found (32).

3. Education

The information on true-parent education, secured from the records, was in most cases based on the statements of the mother. Occasionally this could be verified by referring to other records. The reliability and accuracy of

this information is discussed in greater detail later. In this study the statements of extent of education are taken at their face value since the best assumption is that a correction would have a systematic effect on the entire distribution.

The relationships between the child's *IQ* and the education of his true parents are summarized in Table 12.

TABLE 12

	True mother education <i>N</i> —129	True father education <i>N</i> —85	Mid-true-parent education <i>N</i> —84
First test	$r .07 \pm .06$	$r .09 \pm .07$	$r .10 \pm .07$
Second test	$r .24 \pm .06^*$	$r .36 \pm .06^*$	$r .33 \pm .07^*$
Third test	$r .24 \pm .06^*$	$r .25 \pm .07^{**}$	$r .23 \pm .07^{**}$

*Reliable at the 1 per cent level of confidence (20, p. 212)

**Reliable at the 5 per cent level of confidence (*Ibid.*).

There was an increase in size of correlations between child *IQ* and true parent education between the first and second tests. Between second and third tests the correlation remained the same for mother's education and decreased for true-father and mid-parent education. Unlike the correlations between child *IQ* and foster parent education, and child *IQ* and mother's *IQ*, these coefficients show no increase in relationship, but could instead be interpreted to indicate a stable or a decreasing relationship. The hazards of argument with correlations of such small size are clearly evident.

The pitfalls of correlational studies are still further illustrated when the sample of 88 cases in which the *IQ* of the true mothers is known is abstracted from the total group. The children of these 88 mothers do not deviate significantly in mean *IQ* from the children whose mothers' *IQ*'s are unknown, and since they constitute 63 per cent of the total group, it could be assumed that the results with the smaller group would parallel those of the total group. Table 13 summarizes the correlations between the children's successive *IQ*'s and the education of their true and foster parents.

No definite conclusions can be drawn from these figures. There is some indication that the relationships increase between first and third tests for both true and foster parents, but all of the correlations are of such a magnitude that further statistical refinement would do little to clarify the situation.

Children of mentally defective mothers. In the second report (33) of this longitudinal study of the mental development of adopted children, a group of 16 with conspicuously poor own-family social histories was selected. The

TABLE 13

Child's <i>IQ</i>	Education of true mother	Education of foster mother	Education of mid-foster parents
	(<i>N</i> —88)	(<i>N</i> —88)	(<i>N</i> —88)
First test	<i>r</i> .14	<i>r</i> —.01	<i>r</i> —.01
Second test	<i>r</i> .03	<i>r</i> .13	<i>r</i> .11
Third test	<i>r</i> .27**	<i>r</i> .11	<i>r</i> .07
	(<i>N</i> —129)	(<i>N</i> —139)	(<i>N</i> —139)
First test	<i>r</i> .07	<i>r</i> .06	<i>r</i> .07
Second test	<i>r</i> .24*	<i>r</i> .17**	<i>r</i> .15
Third test	<i>r</i> .24*	<i>r</i> .20**	<i>r</i> .16

*Reliable at the 1 per cent level of confidence (20, p. 212).

**Reliable at the 5 per cent level of confidence (*Ibid.*).

mothers had *IQ*'s below 74 and were in addition diagnosed as mentally defective, as indicated by such measures as commitment to a state institution. It was found that these children could not be differentiated from the total group of adopted children in mental development. Harms (16) and Speer (34), studying 89 and 68 cases, respectively, also found that when the children of mentally defective parents were removed from their custody at an early age and placed in average or better foster homes, normal development rather than mental retardation followed.

In comparison with these more intensive studies, data on 16 children can add little new information. They are reported here for the interest there may be in three consecutive tests extending into the school ages on children from known poor family histories who were placed in good homes at an early age. Table 14 summarizes the data for this group.

The comparisons in this case are made between the data for the 15 children whose mothers were judged mentally defective in the 1938 study (33) and the data for the remainder of the group, exclusive of these children. The average *IQ* of the mothers of the selected group is 67 as compared to 90 for the balance of the group. Their average education was three years less than that of the other mothers, while the fathers' education was 1.5 years less.

The foster parents of the 15 children had educations three semesters less than the foster parents of the rest of the children and were one classification lower in occupation. Thus not only do the children have the poorest true-family histories, but they have been placed in relatively poorer foster homes as well.

On the first examination the 15 children had an average *IQ* of 118 as compared with 115 for the other children. On second and third examina-

TABLE 14

	Children of mentally defective mothers			Other foster children		
	No.	Mean	Range	No.	Mean	Range
Child's first <i>IQ</i>	15*	118	99-134	124	115	80-154
Child's second <i>IQ</i>	15	108	81-132	124	112	85-154
Child's third <i>IQ</i>	15	107	87-132	124	114	80-159
<i>CA</i> at first test	15	2- 4	1/0- 4/5	124	2-2.7	0/6- 7/11
<i>CA</i> at second test	15	4-10	2/3- 7/3	124	4-4	2/0- 9/11
<i>CA</i> at third test	15	7- 5	4/8-10/6	124	7-1	4/6-12/11
Mother's <i>IQ</i>	15	67	54-74	73	90	50-126
Mother's education	14	7.6	6-11	115	10.5	4- 16
Father's education	7	9	8-13	78	10.5	4- 16
Father's occupation	9	6.2	V-VII	90	6.4	I-VII
Foster mother's education	15	10.5	7-15	123	12	4-20
Foster father's education	15	10.7	7-18	123	12	4-19
Foster father's occupation	15	3.8	I-VII	124	2.8	I-VII

*One child was not re-examined because his foster parents did not wish their child to be "a guinea pig" in research. His true mother's *IQ* was 59 and his *IQ* had been 95 at 5 years 5 months and 108 at 7 years 9 months of age. Both foster parents are high school graduates and the home is in the third occupational classification.

tions the selected group had *IQ*'s of 108 and 107 as compared to 112 and 114 for the remaining 124 children.

Since these 15 children were placed in relatively less superior foster homes, it is of interest to compare their *IQ*'s with those of all children placed in adoptive homes of the four lower occupational classes. It is found that the mean *IQ* for all children placed in foster homes of Classes IV-VII is 113 at 2 years, 107 at 5 years and 107 at 8 years, or closely paralleling the *IQ*'s of children of defective parents at the same ages. Thus it appears that the mental development of children of mentally retarded mothers shows the same pattern as that of children of all types of true family background who are placed in relatively less superior foster homes.

4. Summary

This is the third report of a longitudinal study of the mental development of 139 children who were placed in adoptive foster homes under the age of six months.

The first examination given at a mean age of two years 2.5 months resulted in a mean *IQ* of 116. The second was given at four years four

months with a mean IQ of 112, and the third at seven years .7 months with a mean IQ of 113. Between second and third tests given in the late preschool and early school ages, changes in IQ of 20 points or more continued to be found but in smaller numbers than between first and second tests given at the earlier preschool ages.

Although correlations between child's IQ and foster-parent education have shown a slight increase for the third test, correlations with true-parent education have remained constant or shown a small decline. All series are below child-parent correlations for children in their own homes.

Children whose mothers were mentally defective have continued to show average and above average rates of development and cannot be differentiated from the total group on the basis of intelligence.

Children in the relatively superior foster homes remain on the whole somewhat superior to those in the occupationally lower homes, but the differences decreased at ages corresponding to entry in school.

The children continue to show mental development which is consistent with expectation for own children in homes of the same socio-economic level as the foster parents. The children continue to be markedly superior to the intelligence level of the true parents as measured by tests and as indicated by information relating to education and occupational level.

The results of this third unit of a long-time study indicate that the children placed in foster homes in infancy continue to follow the same general pattern of above average development in the early school years which they had evidenced in the preschool ages. There is no indication thus far that the early favorable progress was impermanent or that the children would revert to the true-parental level in intelligence.

DISCUSSION

1. *Selection of the Foster Child Sample*

Since the children have shown mental development superior to that of their true parents, it may be appropriate to describe the wider population from which this sample of 139 children was drawn. Thus it is possible to determine whether there was any systematic withholding of inferior children from placement or examination.

Exact figures concerning the number of illegitimate and legitimate children from the various socio-economic levels available for adoption cannot easily be secured. It is generally conceded, however, that child placement, whether because of illegitimacy or the insufficiency of home and parents, is much more frequently necessary from homes where poverty, ignorance,

indifference, and irresponsibility prevail than in homes of refinement, culture, and high social and economic standards. Not only do the majority of the children originate from the less effective levels of society, but every child-placing organization is aware of the tendency for legitimate children from superior homes to be cared for by relatives and the illegitimate children to be placed through private sources. Children placed by privately supported agencies, such as the various state-wide aid societies tend to come from the slightly above average to slightly below average homes. Many of these organizations do not accept the children of mentally retarded mothers for placement or have other specifications which eliminate the so-called "worst" true-families from their clientele. Public or state supported organizations having no minimum qualifications for children committed to them for care must therefore accept children from the lowest socio-economic levels and receive very few from superior families. One hundred and one, or 73 per cent, of the children in this study were placed by such a state organization.

It is evident therefore that the socio-economic levels from which these two organizations received the majority of their children for placement are considerably weighted toward the inferior side. However, the family backgrounds of children placed in early infancy, under six months, are not as inferior as those of children placed at older ages (12, 26, 32). Conclusions based on studies of children placed under six months are therefore not directly applicable to children who are older at placement. Not only is there a difference in true-family backgrounds but it is well known to child-placing organizations that homes willing to adopt older children are not, as a group, as superior as are foster homes wishing to adopt infants. There is the further complicating factor that the majority of children placed above six months have experienced environments which do not correspond to normal homes, whether these be hospitals, orphanages, licensed boarding homes, inadequate own homes, or frequent transfers from one to another of these. With children beyond infancy there are frequently problems of health and emotional adjustment which originated in these inadequate home situations and which interfere with successful adjustment in the final adoptive home.

The children in this study were committed and placed between 1927 and 1935 inclusive, with the majority between 1932 and 1935. In the course of another report (29), an accounting was made of all children committed to the state organization and to the private organization, during a given time interval, for the purpose of obtaining information relative to two questions which had been raised. First, what percentage of all children placed under six months of age by these two agencies had been examined? Second, what

is the relation of the percentage of children placed in adoptive homes to the total number of children under six months of age committed to these two agencies during a given period? Data were available on children committed to the state organization between 1933-1937 and to the private organization from 1934-1936. The above dates were selected since the practice of requiring mental tests was not instituted by the public agency until 1933 and by the private agency until 1934. After 1936 many of the examinations for the latter organization were given by a child guidance clinic in the city where the headquarters of the society were located.

During these years, 171 children from the public agency, and 53 from the private agency, or a total of 224 children were placed in adoptive homes under six months of age. Of this number, 204, or 90 per cent had been given one intelligence test by 1937 with a mean *IQ* of 119 as compared to the mean *IQ* of 116 on first test for the group reported in this study. Of the 20 children not examined, 10 had been adopted and 10 had not. Four of the 10 children for whom adoption was completed without examination had moved out of the state. On the 10 cases where adoption had not been completed, reports from the home visitors were available indicating normal mental development.

The second question relates to the percentage of babies placed, out of the total number committed under six months of age during a given period of time. It was found that 302 babies had been committed to the state agency between 1933-1937 and 88 to the private agency between 1934-1936, or a total of 390.

From this number several deductions are necessary. Nine babies were colored children and for the purpose of this study have been excluded. Thirty-five children were not subject to adoption because legal rights of the true parents had not been relinquished. Of this number, 31 were returned to the homes of relatives and four were transferred to other agencies. Since this study is not concerned with the mental development of children in their own homes, these have been excluded. Twenty-one babies died in early infancy. Six additional children were unplaceable because of physical or physiological defects (one born blind, one a mongol, one with birth injury, one with congenital heart defect, one without hands, and one with general physiological defect).

After these eliminations there remained 319 babies, of which 308, or 96.6 per cent were placed in adoptive homes. Consequently, only 11 children, or 3.4 per cent of the 319 children available for adoption, had not been placed. Unplaced children included four withheld from placement

because of unusually poor family histories, two luetic children, two with chronic ear difficulty, one with chronic upper respiratory infection, and two for reasons not classified.

Of the 308 babies committed under six months of age and placed, 224 were placed before, and 84 after, the age of six months. A number of children were near six months of age at the time of commitment and of necessity could not be placed until after reaching six months of age because of the time required for medical examinations, observation, and assignment to the adoptive homes.

Between 1933-1937 and 1934-1936 children committed under six months of age were withheld from adoption primarily for serious physical reasons. Unusually poor family history was the chief barrier in only four of the unplaced cases. Information on the mental development of the children who were placed is available for 96 per cent of the cases.

In the analysis just described were 83 of the 139 children involved in this longitudinal study. Four of the 139 had been privately placed and 52 had been placed before 1933 or 1934 by the respective organizations. Placement policies before these dates were even more liberal than they were for a time following the introduction of psychological services. However, there is no indication that this somewhat older group of children is different from the younger group in any systematic way. It may be assumed therefore that this group of 139 is representative of the children who had been placed in adoptive homes during the same period, that is between 1929 and 1935.

The original subjects of the present study were those children who had had one test prior to November, 1936. At that time 180 children met this qualification in addition to the stipulation that they be white, of North European descent, and placed in the adoptive homes at less than six months of age. When re-examinations were made in 1937, four families declined to coöperate further and 22 either could not be scheduled for retests, could not be located, or were known to have left the state. This left the group of 154 reported in 1939 (32). When the third series of tests was given, it was found that 10 additional families had left the state, four declined to coöperate further, and one child had been returned to the state agency. This left the group of 139 children who are the subjects of this report.

A brief description of the 15 children who dropped out of the study between 1937 and 1940 may be of interest. The group ranged in *IQ* from 89 to 135 with a mean of 114 on first test and 111 on the second. The child who was returned to the institution had *IQ*'s of 90 and 94 and was returned because of the cruelty and neglect of the foster parents.

The foster fathers of those children who left the state include two graduate engineers with advanced degrees, five skilled mechanics or craftsmen, one barber, one farmer who inherited a large farm in a neighboring state, and one semi-skilled laborer who became an itinerant farm worker. Of those who refused further coöperation, one was a prosperous business man, two were skilled mechanics, and one, a tenant farmer. Two of these had not informed the children they were adopted and therefore wished no further contacts, and two did not believe in exposing their children to the indignities of research. There seems to be no indication that a systematic bias might be present among either the children or the foster homes of those who dropped from the project.

The children, 95 per cent of whom are illegitimate, had been referred for adoptive care since their own relatives were either unable or unwilling to provide support in their own homes. Only four of the children had ever lived with their own parents, a few had been in temporary boarding homes, but the majority had known only the regulated environment of a hospital. All were placed under six months of age, with the average at 2.8 months (*SD* 1.7 months).

In 1940, 92 per cent of the children were known to have been legally adopted and all the homes consider themselves permanent regardless of legal status. Where adoption has not been completed the barrier is primarily financial.

It may be concluded, therefore, that this group of 139 children is representative of the children available for adoptive placement from these two organizations which in turn are probably representative of the usual types of child-placing agencies.

2. Education

Because the educational level of the true parents has been higher than that reported by some other investigators, there has been a tendency in some quarters to minimize other evidence on the intellectual, social, and economic status of the parents. The amount of schooling reported has occasionally been construed to indicate superior ability which may account for the above average development of the children. There are several points to be considered which may throw some light on this problem: (a) How accurately do true-parents report their education? (b) How does the reported or actual education of true-parents compare with the education of rural and urban men and women of similar ages in Iowa? (c) How does this compare with the median education in the country as a whole? (d) What is the relationship between intelligence and educational attainment?

a. *Accuracy of report.* The difficulties in attempting to verify the education of persons who had left school 5 to 15 years previous to a survey made it impractical to check this information for the true-mothers of the foster child study. Since it was felt that there was little variation in the samplings of mothers whose children are committed to the public agency over a six- to eight-year period, a more accessible sample was chosen (17).

During 1940, 64 white children under six months of age were committed to the Iowa Soldiers' Orphans' Home. Two of the mothers had been in ungraded classes and the education of two was unknown. Sixty of the mothers reported a mean and median education of 9.0 grades completed. It was possible to verify the actual school history through correspondence with school and county officials and examination of school records in 29 cases. These 29 women had reported a mean grade of 9.1. The verified grade, however, was 8.3 or 0.8 of a grade lower. Fifty per cent of the cases had given a false report of education attained ranging from an understatement of one year to an over-statement of nine years.

In order to make direct comparisons with the true-mothers of children who became subjects of the long-time study, cases placed through private agencies were excluded. This left a group of 103 mothers* who had reported a mean education of 9.4 and median of 9.0 grades. The education reported by the two groups is therefore comparable.

Additional evidence of the similarity of the two groups is found in intelligence test scores. Sixty-three of the mothers of the consecutive test group who were placed by the public agency, and for whom test results were available, had a mean *IQ* of 83 and a median *IQ* of 86. Thirty-eight of the 1940 mothers had a mean *IQ* of 86 and a median of 86. This correspondence in means is interesting in view of the fact that the former were obtained on the 1916 Stanford-Binet, using 16 years as the maximum divisor, while the latter mean and median were secured on the 1937 Terman-Merrill with *IQ*'s computed from the author's tables.

Since the two groups of true mothers of children committed to the same institution were similar in education reported and in intelligence, the more recent sample may be considered representative of the mothers of children in the long-time study. Since the mothers whose education could be verified were found to have overstated their education by approximately one year, it may be concluded that the average education reported in these studies is one grade higher than is actually the case.

b. *Urban and rural education in Iowa.* Before comparisons between the educational levels of the true- and foster-parents and the general population

can be made, it is necessary to determine what the average education for the state may be. It is then possible to determine whether the adults in question deviate from the total group, and in what direction.

Unfortunately the complete results from the 1940 census which was to be "the first complete inventory of the educational status of the population ever undertaken" (37) have not been made available at the time of writing this article. Evidence must still be brought from isolated studies and from preliminary census information.

Several factors affect not only the interpretation of the data which are available but have operated to influence the results of successive studies. Within the past 40 years not only has there been a rapid extension of educational opportunity in rural as well as urban areas but there has been growing social pressure for attendance beyond the "common school" level. Not only is attendance compulsory and the law more rigidly enforced but the age of leaving school has been increased. Opportunities for individualized or special class instruction have been provided for students who are not academically inclined but who nevertheless remain in school. This factor together with a change in educational philosophy has resulted in a tendency toward higher percentages of promotions in the elementary grades (3, 4). The heaviest mortality occurs in the ninth and tenth grades, coincident with reaching the end of compulsory school age and the relatively stricter requirements of senior high school. Those who drop out before graduation are, as a group, below average in intelligence and in educational achievement (5, 21). These and other influences have resulted in an increasing mean educational level throughout the country. It is anticipated that as the older, less educated groups in the population disappear the mean for the total group will continue to rise. Regional differences will be found as long as there are differences in ability to finance public instruction.

With reference to Iowa, Ojemann (24) found that approximately half of those between 19 and 45 years had gone beyond the eighth grade in 1925. Ehrhorn (11) found that half of students in the seventh grade in 1930 graduated from high school. Calkins (7), in Davenport in 1934, found that two-thirds of those enrolled in the ninth grade reached the twelfth grade. Eighty-four per cent of youths 14 to 18 were attending school. Douma (9), in 1936 in Ottumwa, found that 84 per cent of 11-to-18-year-old children were in school or had graduated. In the same year Laughrige (18), in Keokuk, found 83 per cent of youth of similar age in school. Although the child population in the state shrank between 1890 and 1940 (8), the trend toward increased high school attendance continued.

Preliminary reports from the 1940 census (37) indicated that the median education of native white males 25 years and older in Iowa was 8.6 and of native white females was 9.4 grades completed. The urban population is approximately one grade higher than the rural and the female education is higher than the male as Table 15 indicates. These data, however, are still

TABLE 15

	Rural—Farm	Urban
Male	8.2	9 0
Female	8.6	10 1
Total	8.4	10 0

not directly comparable with the parents in the foster-child study because of the differences in age range of the samples. Early census returns include adults of all ages, 25 years and older combined. For a direct comparison it is necessary to know the median grade completed by Iowa adults 25 to 35 years of age.

The most pertinent evidence can be secured from a follow-up study of young Iowa adults (25). In 1923-26 a group of over 600 native white farm children in four representative rural communities were the subjects of an intensive study of the mental, educational, social, and physical development of farm children (3). In *IQ* the group ranged from 50 to 159 with a mean of 98 for the males and 102 for the females. In 1941 when these individuals were between 25 and 35 years of age, as many of these persons as could be located were sent questionnaires under the auspices of the Iowa Child Welfare Research Station, requesting, among other items, information on educational attainment. Seventy per cent of the questionnaires mailed were returned by a group which was representative of the original sample from the standpoint of intelligence in childhood. In addition to the educational status of the 164 men and 184 women who were originally members of the study, information was received for 87 wives and 136 husbands who were within the same age range. The educational environment of these young adults would be classified as rural and rural-non-farm on the basis of the 1940 census classification.

The mean education for men in the original study was 11.6 grades (mean *IQ* in childhood was 98) and for husbands of girls in the original study was 11.5. The mean education for women in the original study was 12.3 (childhood *IQ* 102) and wives of the men in the study was 12.0. These levels are higher than the state-wide results of the census bureau which, however, includes the older less-educated ages. Since there is consistent

evidence (37) that urban education is approximately one year higher than the rural average, it may be concluded that a sampling including urban adults 25 to 35 years of age would not be below, and probably would be above, the average for this rural sampling.

It may be judged therefore that the education of tenth grade reported by the true-parents in the foster-child study is below the average education of young Iowa adults of the same ages. It may be added that although 66 per cent of the population of the state is classified as rural, the true-parents are predominantly urban in origin and therefore should be compared with a group whose educational level is higher than that of this rural sampling.

c. Education in Iowa and the United States. Many of the reports on average education are based not only on populations of all ages and races but on wide geographical distributions as well. It is known that educational opportunity is not equally available in all states and that the educational level of the states varies considerably. *

The median education of native white males 25 years old and over for the entire United States is 9.4 in urban regions, 8.5 in rural non-farm, and 7.8 in rural farm areas (37). The median education for white females of the same age is consistently higher, being 9.9 in urban, 8.8 in rural non-farm, and 8.2 in rural farm areas. The total median for white males and females in all areas is 8.8. Twenty-four per cent of the adult population has completed at least high school. The highest state averages are found in the Pacific region and the lowest in the Southeastern region. Although ranking high in the average education of its native white adult population, Iowa is not the highest in the country.

d. Intelligence and education. The fact that the true mothers reported a mean education of tenth grade was felt by some to be inconsistent with a mean *IQ* of 86. Disregarding for the moment the probability that the report of education is in error by approximately one year, inferences as to the relationship between intelligence and school attainment can be drawn from two other Iowa groups for purposes of comparison.

In the follow-up study of farm children mentioned above, it was found that the men with mean *IQ*'s of 98 in childhood reported 11.6 grades completed. The women with a mean *IQ* of 102 in childhood reported 12.3 grades completed. The high educational attainment of this rural group whose mean *IQ* is average is a confirmation of the below-average status of the true-parent group, since it has been repeatedly shown (10, 35, 40, 21) that those who withdraw before completing high school are definitely inferior in ability and scholarship.

The second group consists of persons so retarded in intelligence that commitment to a state institution for feeble-minded became necessary (31). For this purpose, those cases were selected who were admitted to the state schools for feeble-minded after the age of 15 and under 35, who had *IQ*'s of 50 or above and who were functional cases only, thus excluding epileptics and clinical types. A total of 130 cases was available. These subjects were asked how far they had gone in school, their age on leaving school, and the highest grade finished and passed. The mean and median reported reached was sixth grade, while the highest average grade completed and passed was fifth grade. The average age on leaving school was 15 years and the mean *IQ* of the total group was 62. One-fourth of the group reported eighth grade attendance or higher and 11 per cent had been enrolled in high school. Two of the 130 had been graduated from high school.

This evidence indicates that correspondence between ability and educational level is far from complete. If the mentally retarded, given sufficient years in the classroom, can reach the sixth grade, it is not unreasonable to find the mean education of the dull normal to be tenth grade.

The following general conclusions may be reached:

1. The true mothers in this study probably over-stated their educational attainment by approximately one year.
2. While the mean education of the true parents is somewhat higher than the over all average for the state, based on all adults over 25 years of age, the true parents are below the average education of a sample of rural population 25 to 35 years of age. There may be even a greater deviation in comparison with a sample which would include urban adults of the same age.
3. Comparisons between educational levels of selected groups must be made with special attention to a description of the samples to be compared because of the heterogeneous nature of some of the populations on which the means are based.
4. Dull normal intelligence test level is consistent with an attainment of tenth grade since samples with mean *IQ*'s of 62 reported sixth grade attainment, and samples of 98 and 102 *IQ* reported 11.6 and 12.3 grades respectively.

3. *Social Status of True Mothers*

In 1939-40, financed by the Carnegie Foundation for Research, an independent investigation of several Iowa studies was made by Dr. Neil J. Van Steenberg, geneticist, psychologist, and statistician (39). Dr. Van Steenberg examined the case histories, visited the institutions from which the

children were placed, and made personal visits to the homes of a representative sample of the true mothers of the children in the foster-child studies.

The results are best expressed in his unpublished summary report:

In Dr. Skodak's study the descriptions of the true mothers were terse and objective and I should say she probably erred on the side of brevity and did not augment her descriptions with all the information that could have been obtained for fear the taint of subjectivity might encroach upon her report. This is the procedure normally used in scientific work and is normally a laudable and adequate method but since, in this case, the validity of the objective findings has been challenged, one can but regret that she was not more picturesque in her descriptions even at the cost of some precision. I have found upon examination of the material on which her report was based that the general tenor of her report does not even come near a true description of the lower levels of social strata from which these people, the true mothers and true fathers, were drawn. I was astonished that living conditions in a rural and rather prosperous state like Iowa could reach such a low level.

The school records obtained by the true mothers of the children in question have been taken by some as an indication of a higher intellectual level than the one reflected by intelligence tests. I have found that in Iowa as in a number of other states the modern educational policy in most places is to promote a child regularly regardless of attainments, at least up to a certain limit. With the shift in educational policy from one in which the teacher has to defend the attainment by the child of skills and knowledge as a basis of promotion to one where the lack of promotion is a subject of reports and much justification, has come a condition where mere school attendance is generally sufficient to attain a certain grade and hence grade attainment tends to be a meaningless term.

On the trip which I made to a number of counties in the State of Iowa, I interviewed a number of these true mothers. I made a subjective evaluation of their living conditions and also obtained information about them from relatives and neighbors, etc. A wide range of living conditions was encountered. A few were living what appeared to be lower middle class lives, married to some kind of mechanic, truck driver, or someone in a like vocation, whose houses were reasonably clean and well kept and who now had legitimate children who showed signs of maternal care. But these cases were widely at variance with the average conditions encountered. In most cases these women were found "down by and on the wrong side of the railroad tracks" and in the most dilapidated houses on the least desirable block in town. My recollections are generally of filth, squalor and pitiable living conditions—a complete abandonment of any attempt to attain normal social status or a lack of understanding of the discrepancies between the way they lived and the way they might live

even under relief status. Insofar as the present living conditions of these women reflect their earlier lives and insofar as they reflect their intelligence, the description of the true mothers should be revised downward in a social and intellectual scale rather than upward.

Additional information may be found in the discussion of sample cases.

4. *Follow-up of a Sampling of True Fathers*

The information on the true fathers, frequently limited to the mother's statement of his name, address, education, occupation, and some description of his family, had not been originally secured for research purposes. For this reason certain questions relating to the comparison between mothers' and fathers' intelligence and education could not be answered from the data at hand. In addition, the objection had been raised that since the men were young, untrained, and unskilled and had not yet succeeded in establishing themselves in their life occupation, inferences from occupation to mental level were in error. Stimulated by these problems and by a desire to see the actual adjustment of these men in later maturity, a follow-up study was initiated (1).

The information on true fathers was reviewed and those men were first selected for study where evidence as to paternity was as clear as it is possible to secure. Next, definiteness of address and accessibility were considered. Since the men were scattered over the entire state, plans for this follow-up were combined with other needs to economize on transportation. Even with care, however, the time and expense involved in locating each case 5 to 10 years after the birth of the child was so great that the study was discontinued after 13 men had been contacted. The unusual mobility of these men in communities where the population shows relatively little change is additional indication of their instability.

Since the real purpose of the examination could not be revealed without loss of rapport or jeopardy to the subjects' security, the study was made under the guise of an occupational survey. None of the men who were located refused to cooperate in the tests or in giving information concerning education or occupation.

Table 16 summarizes the information on the sampling of true fathers.

In Table 17 a comparison is made between the data as reported in the published studies and the data as revealed by the follow-up. Data are also given for the true mothers of the children involved.

Education is in terms of years of schooling reported completed. Occupation is classified according to the seven-point scale described by Goodenough

TABLE 16
SUMMARY OF FOLLOW-UP DATA ON TRUE FATHERS

Case number	Educational history	Occupational history	Intelligence test*		
			CA	MA	IQ
1	High school graduate. Six months at Drake Univ.	Ice service man and truck driver 12 yrs. Salary 1938 \$1,611	36	12- 3	76
2	High school graduate	Butter maker at creamery. \$100 per mo.	27-3	15- 0	93
3	Twelve years grade and high school	Farming for self	26-6	14- 1	88
4	Eighth grade. No high school	1930-35 farming. 1935—truck driver for County 50¢ per hr.	31-0	12- 0	75
5	Eleven years	Garage since 1930	33-3	13- 3	83
6	High school graduate. B average	Farm work for brother-in-law	28-8	15- 2	95
7	Eighth grade finished at 14	Farming for self for 2 yrs. Work on payment at \$21 per wk.	29-4	12-10	80
8	Eighth grade	Truck driver for 2 different companies. City at present—\$32.17 per wk.	30-5	12- 6	78
9	Seventh grade quit when 15	1930-34 Brass Co. machinist 1934—Asst. Foreman, finishing room	30-6	15- 4	96
10	High school graduate	1933 salesman for Tea Company, WPA truck driver	31-6	14- 8	92
11	Left school while in eighth grade	Does seasonal trucking	34	11-10	79
12	Eighth grade	Common laborer. Has been on WPA. Buys scrap iron	36	8- 6	57
13	Eighth grade completed. Started ninth grade	Manual labor, farm work, bridge gang. Not heard from for three years.	Not examined—information secured from his parents.		

*Nineteen-sixteen Stanford-Binet in order that the results may be comparable with true mothers' scores. Tests were given during 1939-40.

(15). Intelligence test results were based on the 1916 Stanford-Binet since that was the test used for both mothers and children.

While there are differences in four of 11 cases between education as originally reported and as revealed by the follow-up, the mean education is almost identical. In seven of the 10 cases where an occupation was reported when the child was born, the men were still engaged in the same type of work 5 to 10 years later. In two cases the men had advanced one category and one man had moved from the fourth to the sixth, or very slightly skilled group. The mean occupation remained the same over this period. The three men whose occupation had originally been unknown

TABLE 17

Case number	True father				IQ	True mother	
	Education Skodak data	Follow-up	Occupation Skodak data	Follow-up		Education	IQ
1	unknown	12.5	7	6	76	10	93
2	12	12	6	6	93	10	80
3	12	12	unknown	4	88	12	82
4	12	8	7	6	75	12	95
5	11	11	3	3	83	9	80
6	10	12	7	7	95	11	90
7	8	8	4	6	80	10	
8	8	8	6	6	78	8	74
9	unknown	7	unknown	3	96	8	104
10	12	12	unknown	6	92	8	
11	7	7	7	7	79	12	82
12	7	8	7	7	57	10	92
13	9	8	7	7		8	63
Mean	9.8	9.7	6.1	5.8	83	9.8	85
Median	10.0	8.0	7.0	6.0	82	10.0	82

were somewhat above the average of this small group but could hardly be called superior in status.

The mean *IQ* of 83 for this small sample of men is in the same classification as that of the true mothers, dull normal. Comparison between the education and *IQ* of the men and women in each pair indicates that there is no foundation for the belief that the fathers of illegitimate children are intellectually superior to the mothers.

These results, while based on small numbers, lead to the conclusion that the recorded information on the putative fathers is confirmed by the results of a follow-up study. The information available probably gives a representative picture of the men who were the fathers of the entire group of children. While a girl may have named the wrong man, the information given about him was probably equally representative of the true father. Allegations of paternity must be accepted on faith in these as in all other cases.

5. Illustrative Cases

When individual cases are converted into cold statistics much of the subjective but equally valuable aspect of a study of this type is lost. It would not be possible nor desirable to give brief sketches of every case but the following ones have been chosen as representative of the group as a whole. The comments on the parents and children have been abstracted verbatim from the records made when the children were tested or when the true-parents were contacted (Table 18).

TABLE 18

<i>Both true-parents in follow-up studies</i>			
G.L.K.	CA	1-6	<i>IQ</i> 105
	CA	4-6	<i>IQ</i> 107
	CA	6-7	<i>IQ</i> 106
True mother education		8th grade	<i>IQ</i> 104
True father education		7th grade	<i>IQ</i> 96
True father occupation		Assistant foreman, manufacturing company (III)	
Foster mother education		1 year college	
Foster father education		1 year special training	
Foster father occupation		linotype operator (III)	

Van Steenberg's description of the mother: "Managed to speak to Miss — on 3rd call. She is a domestic earning \$5.00 to \$6.00 per week. Rather nice looking but slovenly. House is as decrepit as any I have seen. There seemed to be people in every room. She lives here with her father. General impression: an average girl, quick and coöperative but slovenly and poorly dressed."

Anderson's description of the father: "An excellent subject to test. Left school after 7th grade at 15 years to become an apprentice. Has had continuous employment since 1930. Lives in a small, well-furnished home."

Skodak's description of the foster home and the child: "Home is a good average craftsman home, in substantial middle class district. Child has own room and playroom in addition, filled with every kind of toy and play material imaginable. Boy has been over-protected but not spoiled. Is expected to take his own part in neighborhood squabbles. Family makes special effort to take him to see how canal locks operate, the building of dams, roads, etc. School progress has been average, with somewhat better than average marks. Impression: A well-poised, average child in a good average home."

<i>Mother in Follow-up Study</i>			
B.J.G.	CA	1-6	<i>IQ</i> 101
	CA	4-6	<i>IQ</i> 93
	CA	7-9	<i>IQ</i> 99
True mother education		7th grade	<i>IQ</i> 83
True father education		5th grade	
True father occupation		Laborer (VII)	
Foster mother education		High school and 3 years nurse's training	
Foster father education		9th grade	
Foster father occupation		Minor professional (II)	

Van Steenberg comments on the true mother: "Mrs. — would probably never reach an *IQ* of 83 again. Her husband (alleged father of child in study) 'could read and write but not terribly good.' She failed her county 7th grade examination except for music. She claims child was legitimate, that she separated from her husband after child was born. Now divorced. She later had an illegitimate child who is with her."

Excerpts from Skeels' comments on the foster home and the child: "Between the second and third examinations there has been a marked improvement in the home and furnishings which now speak of at least high average comfort. Qualitatively responses are—normal or average—good reasoning and comprehension. Attention, interest and effort good. At the time of the previous examination there was a marked articulatory speech defect. Now her speech is almost perfect."

"B.J. has had a hectic health history. At 2½ years severe pneumonia. At 4½

TABLE 18 (*continued*)

years, measles with high fever for eight days. At $5\frac{1}{2}$ severe foot infection; strep throat and middle ear infection, followed by tonsillectomy and six weeks in bed. There has been frequent bronchitis and chronic appendicitis. Appendectomy will be necessary later and the child is under good medical care. At the time of the examination she was in good health with the exception of the chronic appendicitis. "B.J. attends a private school but education has been frequently interrupted by illness. Parents have provided extra dramatic arts, physical culture and remedial reading lessons and she is to be in the 3rd grade (at the age of 8). The —'s have handled the problem of education and poor health in a very adequate manner."

F.E.H	<i>Child Showing Decline in IQ</i>			
	CA	1- 5	IQ	143
	CA	2- 5	IQ	141
	CA	4- 8	IQ	111
	CA	6-10	IQ	112
True mother education	High school graduate		IQ	82
True father education	High school graduate		IQ	88
True father occupation	Farmer (IV)			
Foster mother education	1 year normal school			
Foster father education	8th grade			
Foster father occupation	Farmer (IV)			

Excerpts from Skeels' and Skodak's comments on the foster home and the child: "The home is in one of the most isolated villages in southeast Iowa, not more than 20 families, no postoffice, not even a filling station. The farm is small and produces a bare living. Costs are low and ambition is limited. This is the only home in the community providing a sandbox, tricycles, bicycles and a rich variety of toys.

"On the first two tests child was unquestionably superior. Language was established early, child was alert, interested and curious. Family gave ample opportunity for new experiences—took him to a state fair, band concerts, etc. On last two examinations, although still above average, the 'spark' of early childhood was gone. The family had become so impressed with his early precociousness and wise comments that they kept recalling those rather than encouraging him to new activities. The school is limited to readin', 'ritin' and 'rithmetic. The teacher was ill-prepared, old and unstimulating. F was making average progress in school but was 'too full of mischief.' He is still obviously superior to the other children in the village, but there is nothing in his home or neighborhood which could possibly nourish his early intellectual promise. The foster parents, older than the average, have lost their early zeal for his development and are content to keep him their 'little boy.'"

J.L.	<i>Child Showing Progressive Increase in IQ</i>			
	CA	1-3	IQ	99
	CA	2-7	IQ	126
	CA	5-6	IQ	139
True mother education	1 year college		IQ	109
True father education and occupation	unknown			
Foster mother education	College graduate			
Foster father education	College graduate			
Foster father occupation	Clerical (III)			

This child is a half-sibling of another child in the study. The half-sibling, whose true father was a high school graduate, presumably not the same person as the father of J.L., has had IQ's of 102, 107, and 113. The foster home of the half-

TABLE 18 (*continued*)

sibling, while a substantial middle-class home is not as superior in cultural, economic, or social status as the home of J.L.

Skodak's comments on foster home and child: "Mrs. — was in the top 10 of her college graduating class and comes from a family in which cum laude degrees are customary. Mr. — is quiet and rather retiring. Finances adequate but dancing and music lessons must be budgeted to be available. However, anything educational, like blackboards, toy typewriter, books are provided without question.

"J is a typical superior child at 5½ years. As an infant she was lovely but stolid and did not venture until she could do a thing without failure. Refused to walk until 20 months—then did so with no falls or bumps. Now, with her exceptionally soft clear skin, long dark curls, sweeping lashes and fine features, she is one of the five most beautiful children in the study

"Attitude during the test was one of vast enjoyment. Made quite a to-do over some of the more difficult items, then did them without error.

"Parents were not quite at ease with her during babyhood. Were afraid they might do the wrong thing. As she gets older they enjoy her increasingly. 'There seems to be more and more to talk about and do together.' Began dancing lessons at 4, will continue and add piano at 6, and other instruments, art, and singing in years to come. J is much interested in all these. Parents recognize superiority and the responsibility of keeping ahead of her. Hope to keep her busy enough that school work will have to be done efficiently and quickly. Do not believe in acceleration because of possible social maladjustment. Seems to be little danger of overloading. Parents too sensible and J too well adjusted."

W.L.A.	<i>Superior Mother, Superior Child</i>		<i>IQ</i>	
	<i>CA</i>	2-11		
	<i>CA</i>	4- 2		
	<i>CA</i>	6- 3		
True mother education	High school graduate			
True father education	Terman Group Test		<i>IQ</i>	128
True father occupation	Unknown			
	Salesman (III)			
Foster mother education	High school graduate			
Foster father education	High school graduate			
Foster father occupation	Salesman (III)			

This is the only true mother in the group with intelligence rating in the superior group.

Excerpts from Skodak's comments on foster home and child: "This home would be ranked in the top ten in the study from the standpoint of culture, financial security, and social prominence. Both parents come from fine old families and there is some income besides the father's salary.

"The presence of a maid does not relieve W of responsibility for his clothes and order in the playroom. He attended private nursery school for two years and is now in one of the best public schools in a large city. Parents plan half of every week-end for some interesting trip for the children. Relationship between father and son very close. Are encouraging his intellectual interests without pushing him. He is being considered for double promotion but there are several equally superior children in his class and the parents agree they would rather have enrichment than acceleration. (Impressions.) An exceptionally superior home and a boy who just fits from every standpoint."

D.I.A.	<i>Inferior Mother, Superior Child</i>		<i>IQ</i>	
	<i>CA</i>	1-1		
	<i>CA</i>	2-5		
	<i>CA</i>	4-2		
	<i>CA</i>	8-8		
			<i>IQ</i>	134
			<i>IQ</i>	121
			<i>IQ</i>	132
			<i>IQ</i>	132

TABLE 18 (*continued*)

True mother education	8th grade	<i>IQ</i>	74
True father education	Unknown		
True father occupation	Shoe repair (V)		
Foster mother education	1 year college		
Foster father education	High school graduate		
Foster father occupation	Mailman (V)		

The true mother left school at the end of the 8th grade at the age of 14. She is described in the recorded history as showing "typical retardation."

Excerpts from Skodak's comments on foster home and child: "A substantial middle-class home in a fair sized college town. Parents active in P.T.A. and church organizations. Own son was superior student received an appointment to Annapolis.

"During D's preschool years mother was active in promoting a play group which D attended. D is the leader of a large neighborhood group of children. She has more toys and play apparatus than anyone for blocks around. Much of it is home made by the father and brother. She is now becoming interested in cooking and sewing and takes pride in being 'mother's helper.'"

IN CONCLUSION

As a result of changing world conditions plans for re-examinations in 1942-43 have had to be postponed. It is hoped, however, that subsequent reports on this group of children can be made.

There has been no attempt to determine relative contributions arising either from genetic or environmental influences. The only interest has been in following the development of a group of children known to come from families described as socially, economically, and culturally inferior. Placed in above average and superior homes at an early age their development has been equal to that which would be anticipated for own-children in these homes. This superiority has continued through the early school ages. The social implications are left to the judgment of the reader.

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ABSTRACTION OF FORM AND COLOR IN CHILDREN AS A FUNCTION OF THE STIMULUS OBJECTS*

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Since its introduction by David Katz in 1913, the problem whether children prefer form or color in their judgment of similarity and difference has received repeated experimental treatment (1, 2). Most of the attention, however, seems to have been on the *classification* of the child, or *traits* inherent in him, as the determinant of the choice. Thus age, sex, intelligence, and individual differences appear to have been most exploited. The studies to be summarized here are concerned, instead, with the child's judgment as a function of the objects presented; for, form and color are always those of something, and the nature and character of the specific things involved would seem necessarily to be among the decisive factors affecting the child's reactions.

The procedure was in general as follows: Two *choice objects*, different from each other in both form and color (*e.g.*, a red circle and a green square), were shown with a *standard object*, which was identical with one of them in form and the other in color (a red square or a green circle), but never in both. The child was asked to indicate which of the choice objects was "just like" the standard. For control, the relative spatial positions of the choice objects had to be reversed; both of the two possible variations of the standard had to be employed; and, finally, the form-color combinations in the choice objects had to be exchanged (*e.g.*, a red circle and a green square had to be supplemented with a red square and a green circle), with corresponding variations in the standard. Eight choices, therefore, were required for each form-color constellation.

In a preliminary study Miss Hsün Hua tried first on 21 kindergarten children three kinds of material, namely, plane geometrical figures, solid geometrical figures, and plane figures of real things (man and familiar animals). Two sets of each kind were used. The mean percentages of *form* choices for the three kinds of material are, in the order mentioned, 71.4 ± 5.7 , 72.6 ± 5.8 , and 82.7 ± 4.6 respectively.¹ The differences among the means

*Facilitated by the State Department, accepted for publication by Arnold Gesell of the Editorial Board, and received in the Editorial Office on May 15, 1943.

¹Tobac has found that with geometrical figures there were more color than form

TABLE 1
MEAN PERCENTAGES OF FORM CHOICES IN EXPERIMENT I

Degree of difference	CC	Series	FC
D_1	8.3%		88.3%
D_2	22.9%		77.9%
D_3	34.2%		71.7%

are not statistically significant. (Fisher's t for the greatest difference=1.63.) Form choices, however, can be seen to dominate.

Next, a comparison was made between the situation where the difference in form is relatively great and that in color is small, and *vice versa*. For small form differences, a square was combined with a rectangle, and a circle, with an ellipse. For great form differences, a very irregular shape was matched to a square or a circle. Small color differences were represented by a red and a pink in one case and two yellows of different saturations in another. Complementary primary colors fulfilled the requirement of great color differences. This time the result is unambiguous. The character which carried the greater difference became the main basis of the choice. When the prominent difference was in color, color choices constituted 87.5 per cent, and, when it was in form, form choices constituted 93.1 per cent.

Lastly, the influence of the *type* of concrete objects was investigated. With a new group of 20 children of similar age, toy dresses of different styles and colors were compared to folded paper handiwork representing different objects, namely, a boat and an old man. For comparison a set of plane geometrical figures was again included. The form choices are 100 per cent for the paper handiwork, 75 per cent for the geometrical figures, and 0 per cent for the dresses.

With the above as the basis more highly controlled experiments were carried out by Mr. Hsiang Wang. In Experiment I, the choice objects had a constant difference in one character, with the difference in the other character varying in quantitative degrees. Thus in the *constant form difference* series (FC) the forms were always a circle and an isosceles triangle, but the color difference varied in three steps. A light grey (C_1) was presented in one set with a slightly deeper grey (C_2); in another set, with a still deeper grey (C_3); and, in the third, with a very deep grey (C_4). In the *constant color difference* series (CC), correspondingly, the colors were always a red and a green, but a square (F_1) was matched in one set with a rectangle

choices, but with significant everyday figures the situation was reversed. See Stern (1, p. 427).

TABLE 2
FISHER'S *t*-TEST FOR THE MEAN DIFFERENCES IN EXPERIMENT I

Mean difference	CC	Series FC
M_1-M_2	2.95	2.61
M_2-M_1	2.55	1.82
M_1-M_3	4.53	3.63

According to Fisher, with $N=30$, the mean difference is to be regarded as "significant" when $t > 2.04$ ($p=0.05$), and "very significant" when $t > 2.76$ ($p=0.01$).

that approached a square (F_2); in another set with one that was quite long and narrow (F_4); and in still another with one that was intermediate (F_8). There were, therefore, 24 choices in each series. Thirty kindergarten children, 3-6 in age, served as *S*'s. The order of the choices was random and varied from child to child.

In Table 1 are presented the means of the *form* choices in percentages. The symbols D_1 , D_2 , and D_3 represent the three degrees of differences,—in form for the *CC* series and in color for the *FC* series. The reliability of the mean differences, as expressed by *t*, are shown in Table 2, in which M_1 stands for the mean of the form choices for Set D_1 , and so forth. With one exception all the differences are "significant" or "very significant." This and especially the perfect regularity of the variation in the results in accordance with changes in the stimulus condition indicate unmistakably that, with color difference constant, the proportion of form choices increases as the form difference between the choice objects increases, and, with form difference constant, it decreases (i.e., that of color choices increases) as the color difference between the choice objects increases.

When figures of real things are compared with meaningless geometrical figures, the facts proven in the last experiment enter as a disturbing factor; for the difference between two real things in form *per se* is usually rather striking. In Experiment II the attempt was to investigate the *meaning* of real objects, apart from their form difference, as a factor affecting the child's response. Series I of the material involved a little book and a bottle of ink, each being available in two colors, red and green. Painted wooden replicas were prepared which resembled them in shape and color, but were easily distinguished as imitations. Series II included similarly double sets of real objects and models, —a pencil and a ping-pong ball in red and white. The *S*'s were 30 kindergarten children, different from those used in Experiment I.

The results are shown in Table 3. Whereas the difference between the means of form choices for the *book-bottle* series is significant, that for the

TABLE 3
PERCENTAGES OF FORM CHOICES AND t FOR THE MEAN DIFFERENCES IN EXPERIMENT II.

Nature of objects	Series <i>Book-bottle</i>	<i>Ball-pencil</i>
Real	48.3%	51.7%
Replicas	44.2%	52.1%
t	2.57	0.17

ball-pencil series is quite negligible. In other words, real things do not seem to have a very unequivocal advantage over their wooden replicas in favoring form choices. Two explanations suggest themselves: Either (a) the "meaning" of objects in itself has no effect in favoring form choices, whatever advantage over mere geometrical shapes they have in this respect being due to the striking form difference usually obtaining between different real objects; or (b) the reproductions by their very resemblance to the real things take on "meaning," and/or may even acquire a *toy value*, which make them no longer mere forms to the children.

In appendix it may be pointed out that, although, the nature of the stimulus objects is of unquestionable importance in determining the abstraction response of the child, the individual as a factor is none the less real. This is seen in the significant correlations among the results for different sets of experimental materials. In Experiment I, the correlations among different sets in the same series range between 0.44 and 0.83, with a median of 0.68. In Experiment II, the correlations between choices for real objects and their corresponding models for the *book-bottle* series and the *ball-pencil* series are 0.95 and 0.98 respectively.

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PRINCIPLES OF SELECTION IN CHILDREN'S "PHENOMENISTIC" EXPLANATIONS*

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A. THE PROBLEM (1)

In his well-known theory on the child's conception of causality Piaget (1930) distinguishes a type of explanation to which he has given the name "phenomenistic causality." "Two facts given together in perception, and such that no relation subsists between them except that of contiguity in time and space, are regarded as being connected by a relation of causality" (p. 259). Similar explanations given by children have been noted by Zawirska (1930), Osaki (1934), Deutsche (1937), and Lacey and Dallenbach (1939). In practice, it is often difficult to exclude from this category the "practical" or "if-then" explanation described by Zeininger (1929), in which what one has to do in order to bring about certain results is stated without insight into the *modus operandi* of the causal process.

But in Piaget's conception, "the child makes associations at random"; "anything can produce anything" (p. 253). Huang (1930), in his study of children's explanations of strange phenomena, has found reasons to doubt the validity of this statement. Instead, certain "factors of relevancy" are found to be operative, making certain facts much more likely to be taken *phenomenistically* as the cause of a given fact, than other equally concomitant facts. The experiments to be summarized here were designed to test the existence and nature of such selective factors.

B. PART I

1. *The Procedure*

The procedure in general consisted in demonstrating to the child certain unfamiliar phenomena and asking for causal explanations. In Part I, as suggested by some of Carla Raspe's early work (1924), the strange phenomenon was regularly accompanied by a number of really irrelevant facts. The purpose was to see whether the child would mention as the cause of the

*Facilitated by the State Department, accepted for publication by Arnold Gesell of the Editorial Board, and received in the Editorial Office on May 15, 1943.

strange phenomenon some of the concomitant facts more readily than the others. Three experiments were performed:

a. The colored water

The strange phenomenon was that a glass of water changed in color into red and back colorless again. The "water" was of course a solution of phenolphthalein and the change was caused by a few unnoticed drops of sodium hydroxide (NaOH) and sulphuric acid (H_2SO_4) previously put in the respective glasses. *E* put a red paper tube over a tall-legged glass with red designs; took some of the water from a basin with a beaker and with her left hand, poured it into the glass concealed by the red paper tube; turned the red light from an electric torch on the tube; asked the child to put on a pair of very unusual spectacles which had belonged to somebody's ancestor; and finally, removing the paper tube, revealed the water which had changed into red. After the child gave his explanations, *E* put a white paper tube over a flat-bottomed glass with white designs; took the glass of red liquid in her right hand; poured it into the glass inside the white paper tube; turned off the torch light; removed the spectacles from the child; uncovered the glass of the now colorless liquid; and again called for explanations.

b. The rising test-tube

A smaller test-tube rose in a larger one into which it was slipped when both were held upside down. *E* first put the smaller test-tube into the larger dry, and let the child see that, when turned wrong end up, the former would fall out. Then she filled the larger one half full with water; added some red liquid; applied a little paste to the bottom of the smaller one; slipped it into the larger until it touched the water; held it upside down with one hand under an over-hanging horse-shoe magnet and above a dish; and with the other hand repeatedly made fanning movements upward. The smaller test-tube would rise in the larger as the water flowed down round the former.

c. The fluctuating flame

A lighted candle and a lamp chimney put over it were stood up in a dish of water, so that ventilation could take place only from the top end of the chimney. When a chimney of small diameter was used the air supply was inadequate and the flame alternately waxed and waned. The phenomenon was attended by having black stripes on the chimney; using a blue liquid in the dish; setting a metronome beating; turning on and off an electric torch; tapping rhythmically on the floor with the foot; and saying "Up! Up!"

and "Down! Down!" at appropriate moments. Next, the candle was placed on a dish with clear water in it, and covered with a large lamp chimney without designs but with a human form cut out of paper clipped on to it, and the flame of the candle remained steady throughout.

Twenty-nine boys and 22 girls from several kindergartens and primary schools in Hangchow, 4-13 in age, served as S's, 40-50 of them taking part in each experiment.

2. The Results

The responses show clearly that the different concomitant circumstances varied widely in their likelihood of being accepted as the cause of the phenomenon. The number of times the various facts were mentioned in the explanations are as follows: *Colored water*:—red torch light—47, different colored paper tubes—31, spectacles—13, colored designs on the glass—8, shape of the glass—1, and use of different hands—0. *Rising test tube*:—paste—23, magnet—22, fanning movement—13, red liquid—6, and dish—0. *Fluctuating flame*:—torch light—26, color of water in dish—20, metronome—11, verbal command—4, and tapping with foot—1.

The child did not always stop at the mere mention of the concomitant fact as the explanation. In 54 per cent of the instances he was able, upon further questioning, to elaborate his answer by giving some sort of *rationale* of the causal connection. For example, the water reflected the red light of the torch and appeared red; the smaller test tube was sucked up by the magnet; the flame waned when the wind blew into the glass tube; etc. Such explanations usually involve the application of some simple, everyday physical principles familiar to the child. The resulting explanation is wrong, but possesses a certain plausibility and rationality. Huang (1930) has found this most typical of children's explanation of unknown phenomena, and has called it a "naïve explanation." *Phenomenistic explanations develop and merge into naïve explanations*, especially for the older children.

Just what are the effective principles of selection is still a matter for interpretation. The proper scientific procedure, it seems to us, is to make hypotheses as best one can on the basis of data like the above, and then to subject each hypothesis to crucial experimental tests. Some of our own suggestions, admittedly intuitional, are: (a) amenability to rationalization into "naïve explanations"; (b) similarity between cause and effect; (c) strangeness of the thing or event involved (spectacles, metronome); (d) Actions elaborately carried out; and (e) contiguity of the related facts being one of the factors rather than the all-sufficient determinant.

In Part II, one of these factors, *similarity*, was submitted to a test.

C. PART II

1. *The Procedure*

Previous investigations of children's causal thinking usually made use of Piaget's "clinical method" or one of the mental test procedures. In the present study the attempt was to apply a more rigorous technique of controlled experimentation. Two mutually complementary experiments were carried out. Experiment I involved the change of *color* in a piece of paper. A slip of red litmus was placed in Beaker *A* and covered with tap water. Then the contents were emptied into Beaker *B*, wherein a few drops of NaOH had previously been deposited which caused the paper to change into blue. Finally, the contents were poured into Beaker *C*, in which, similarly, the presence of a little H_2SO_4 made the paper change back into red. The demonstration was presented under three different conditions: (a) Three pieces of cardboard, one blue and two red, but of a uniform size ($10 \times 16 \text{ cm}^2$), were on the table. Beaker *A* and *C* were placed on the red and Beaker *B*, on the blue. Thus the color the slip of paper in the beaker assumed was *similar* to the color of the cardboard on which the respective beaker was set. This will be referred to as variation C_s (C =color, s =similar). (b) The three pieces of cardboard were uniformly grey, but the middle one, on which Beaker *B* was placed, was larger ($16 \times 24 \text{ cm}^2$) than the other two ($8 \times 16 \text{ cm}^2$). The change of color was therefore accompanied by a change of size in the cardboard background. This constitutes variation C_d (d =dissimilar). (c) In variation C_n (n =no), the beakers were set directly on the table, with no irrelevant backgrounds.

Experiment II involved, on the other hand, a change in (apparent) size. Jastrow's illusion was employed, the sectors being presented one beyond the other on the table. After the child indicated which "was" the larger the positions of the sectors were exchanged. The phenomenon was shown under three conditions corresponding to those of Experiment I: (a) In situation S_s (S =size, s =similar), the lower sector, which looked larger, was put on the larger piece of grey cardboard mentioned above, and the upper sector, on one of the smaller. (b) In the *dissimilar* situation, S_d , the sectors were presented against the blue and the red cardboard backgrounds respectively. (c) No cardboard was used in the condition S_n .

Sixty-six children, 4:9—9:4 in age, were divided into six groups of 11 each. The individuals in the different groups were roughly matched in age, sex, grade, and marks earned on the two main courses on the school curriculum, *Chinese* and *Common Knowledge*. Each child served in one of the three variations for each experiment, but never in corresponding variations,—

i. e., Group 1 took up C_s and S_d ; Group 2, C_s and S_n ; Group 3, C_d and S_s ; Group 4, C_d and S_n ; Group 5, C_n and S_s ; and Group 6, C_n and S_d .

2. The Results

The children's responses are classified into three categories: (a) those involving the acceptance of the cardboard backgrounds as the explanation, with or without a *rationale*; (b) those in which these concomitant circumstances were entirely overlooked but other or no explanations were given; and (c) those in which the cardboards were mentioned but were soon given up for some other explanations, or their function was interpreted in some forced fashion so as to imply a factor of similarity. An instance of the latter was the case where the child claimed that the red cardboard on which the sector looked smaller *was smaller* than the blue cardboard. This third category will be characterized as "partial acceptance" of the concomitant fact.

The percentages of each type of response for the various conditions are shown in Table 1. When the phenomenon and the accompanying conditions

TABLE 1
TYPES OF RESPONSES

Experiment	Conditions	Accepted	Partially accepted	Not accepted	
				Other explanations	No explanations
I	<i>s</i>	82.2	0.0	0.0	17.8
	<i>d</i>	8.9	8.9	35.6	46.6
	<i>n</i>	—	—	47.7	52.3
II	<i>s</i>	82.8	0.0	0.0	17.8
	<i>d</i>	13.2	30.0	37.8	20.0
	<i>n</i>	—	—	47.9	52.1

were *similar* (*s*), cases of acceptance constitute 82.2 per cent in both experiments. When they were *dissimilar* (*d*), there were only 8.9 per cent and 13.2 of acceptance, together with 8.9 per cent and 30 per cent of partial acceptance for Experiment I and II respectively. The potency of *similarity* as a factor favoring phenomenistic coupling of cause and effect is regarded as substantiated. There do not seem to be any consistent age trends.

When the concomitant condition was not accepted as the explanation, the child either gave other explanations or none; and such other explanations as given are entirely comparable to those elicited when no irrelevant backgrounds were used. Typical answers for Experiment I are: *there was something in the beaker*; and, in "if-then" fashion, the color of the slip of paper changed *when you poured it into the next beaker*. For Experiment II, the

most common answers are: naïvely, the upper sector looked smaller *because it was further away*; the lower arc of the upper sector was "smaller" than the adjacent upper arc of the lower sector; and, the sector put above looked larger and the one put below looked smaller ("if-then" type).

D. CONCLUSIONS

Children can be induced to regard a concomitant fact as the cause of a phenomenon, but all concomitant facts are not so accepted with equal readiness. Certain factors of selection are operative and *similarity* between cause and effect is one of them.

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EXPERIMENTAL ANALYSIS OF CHILD ANIMISM*

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A. THE PROBLEM

The purpose of this experiment is to test certain hypotheses concerning the problem of child animism. In a previous paper by the senior author (1) the studies of Piaget (2) and of Russell and his collaborators (3) are reviewed, and the alleged universal tendency in children to regard all things as alive and "endowed with will" is questioned. The evidence offered in support of this theory seems to the reviewer to involve often the interpretation of children's verbal responses from adults' point of view. It is suggested that when a child gives an affirmative answer to the query whether a certain object is "living," it is not to be assumed that he means necessarily thereby that it is endowed with all vital functions, plus thought, volition, and moral judgment. Instead, the child's acquaintance with the specific properties and relations of the object are probably more fundamental and accurate, whereas his understanding of the significance and usage of the term "living," which is used even by adults in a variety of connotations, is more vague, variable, and inadequate. It is further conjectured that for some children "living" and "having life" may have different meanings.

More generally, the principle of differentiation is accepted as a valid explanation of the genesis of the ideas of life and inanimation, but differentiation is understood to imply a transition from some neutral and indeterminate state to the gradual appearance and clarification of the dichotomy by mutual definition and contrast, rather than from universal animism to physicalism. Before complete differentiation is achieved, there would naturally be errors and confusion; the more an object partakes of the properties typical of living things, such as motion and "physiognomic characters," the more it is likely to be mistaken as "living,"—just as the scarecrow is avoided by the birds as if it were the farmer himself.

B. METHOD AND PROCEDURE

Seven questions about 10 objects were asked of 40 children. One half

*Facilitated by the State Department, accepted for publication by Arnold Gesell of the Editorial Board, and received in the Editorial Office on May 15, 1943.

of the children was 3;5-5;11, and the other half, 6;0-8;7 in age. The objects, representing various degrees of apparent animation, comprised the *dog*, the *tree*, the *river*, the *stone*, the *pencil*, the *bicycle*, the *ball*, the *automobile*, the *watch*, and the *moon*. The questions were whether the object is *living*, *has life*, feels *pain* when pricked, is capable of *wanting* and not wanting, can be *good* or not good, has anything it must do (*function*), and performs this *purposely*. (The first two questions are concerned with the problem of "animation" and the last five, with "anthropomorphic traits.") The individual questions will be referred to by the underscored words or their variations.) Each query was preceded by an explanation in terms of the child's concrete experience, and generally followed by "Why?" or "How do you know?" To avoid "halo" effects, all 10 objects were gone through with each query before another query was brought up. The objects as well as the questions were taken up in a carefully worked out random order, excepting that, of the objects, the *dog* and the *stone* always came first and of the questions, *living* and *having life* never followed each other. Each child was generally seen twice. One *E* conducted the interrogation while another student took notes. Responses were classified immediately after the child left the room, by mutual consent, into the categories of *affirmative*, *negative*, and *doubtful*.

C. THE RESULTS

The answers are first analysed as to whether they are *right* (*R*), *wrong* (*W*), or *doubtful* (*?*). The responses to the last three questions concerning

TABLE 1

Age groups	Objects	<i>Living</i>			<i>Having life</i>			<i>Fine traits</i>		
		<i>R</i>	<i>?</i>	<i>W</i>	<i>R</i>	<i>?</i>	<i>W</i>	<i>R</i>	<i>?</i>	<i>W</i>
3;5-5;11	Dog	100.0	0.0	0.0	100.0	0.0	0.0	90.0	2.5	7.5
	Tree	52.4	0.0	47.6	33.3	4.8	61.9	76.9	12.6	10.5
	Inanimate	51.0	5.5	43.5	83.3	6.9	9.8	59.0	16.9	24.2
	Average	56.0	4.4	39.6	80.0	5.9	14.1	61.1	16.3	22.6
6;0-8;7	Dog	100.0	0.0	0.0	100.0	0.0	0.0	97.4	0.0	2.6
	Tree	36.8	10.5	52.6	26.3	10.5	63.2	86.2	2.1	11.7
	Inanimate	70.4	4.7	24.9	88.5	2.7	8.8	79.8	5.9	14.3
	Average	70.0	4.8	25.2	83.4	3.2	13.4	82.2	5.0	12.9
All S's	Dog	100.0	0.0	0.0	100.0	0.0	0.0	93.7	1.2	5.0
	Tree	44.6	5.2	50.1	29.8	7.7	62.5	81.6	7.4	11.1
	Inanimate	60.7	5.1	34.2	85.9	4.8	9.3	69.3	11.5	19.2
	Average	63.0	4.6	32.4	81.7	4.5	13.8	71.6	10.6	17.8

the *dog* are exempt from this treatment, inasmuch as we psychologists don't seem to be too sure of the correct answers ourselves! The results are presented in a condensed form in Table 1.

1. *Ideas about Animation*

In the total averages many instructive facts are masked which need to be analysed. That the *dog* was said to be *living* and to *have life* in 100 per cent of the instances is hardly "animism." More worthy of the term is the case where an inanimate object was so classified. This happened, for all subjects, in 34.2 per cent of the responses for *living* and only 9.3 per cent for *having life*. The significance of these figures is further qualified by the fact that the *tree* was said to be *not living* in 50.1 per cent, and to *have no life* in 62.5 per cent of the cases. No one, of course, would seriously speak of a "de-animistic" tendency in children. The explanation is rather to be sought in the specific apparent characteristics of the tree, namely, its inertness.

The eight inanimate objects, arranged in the order of decreasing percentage of correct answers, appear as follows: *Re living*: pencil (90.5%), *stone* (90.2%), *river* (82.8%), *ball* (64.6%), *automobile* (51.2%), *bicycle* (50.6%), *watch* (27.9%), and *moon* (27.8%); *Re having life*: *river* (100%), *stone* and *pencil* (97.6%), *bicycle* (97.2%), *ball* (87.9%), *automobile* (85.2%), *watch* (80.0%), and *moon* (41.6%).

There is always a difference between the figures for *living* and for *having life*. More correct answers obtain for the latter in the case of inanimate objects and less, in the case of the *tree*. That is, the children were more strict in granting the status of *having life* than that of *living*.

2. *Ideas about Anthropomorphic Traits*

Although the *tree* was so often claimed to be inanimate, answers regarding the five traits are right in no less than 81.6 per cent. In the case of the inanimate objects the frequency of correct statements (69.3%) falls in between those for *living* (60.7%) and for *having life* (85.9%).

The order of correct responses for the eight inanimate objects is as follows:—*stone* (89.2%), *river* (79.4%), *bicycle* (73.8%), *pencil* (72.8%), *automobile* (64.6%), *ball* (61.6%), *moon* (57.6%), and *watch* (55.5%). Of the five traits, *pain* has the highest percentage of correct answers (92.8%), then come in order *want* (86.6%), *being good* (66.2%), *purpose* (60.5%), and *function* (48.2%). *Pain* is obviously most easily understood because of its outward signs. Expressions for *function* and for utility are difficult to differentiate, so are those for *being good* and being in proper working order.

Responses to the question about *purpose* are found to be the hardest to interpret; no less than 52.7 per cent are classified as *doubtful* for the younger subjects.—In interpreting the results, one must distinguish between assigning a trait to a thing with clear appreciation of the significance of the former and not knowing its meaning well enough to deny it of the thing.

3. Age Difference

In regard to the anthropomorphic traits, the older group of children gave more correct answers than the younger for all objects. Regarding animation, however, the *tree* and the inanimate objects again present different pictures. Whereas there is a higher percentage of correct responses for the older subjects about the latter, there is actually an increase of wrong and doubtful responses about the former. The older children, in other words, were more inclined to doubt whether the *tree* is to be considered animate. The difference between *living* and *having life* tends to decrease with age.

The data are next analyzed as to whether ideas about animation agree with those about anthropomorphic traits. Thus when a thing is said to be alive and capable of wanting, it is a case of agreement. Where one or both of the answers are ambiguous, the problem of agreement is also undecided. The results are shown in Table 2, in which *A* stands for agreement, *D*, for

TABLE 2

Age groups	Objects	Category	<i>A</i>	<i>Living</i>		<i>Having life</i>		
				?	<i>D</i>	<i>A</i>	?	<i>D</i>
3;5-5;11	Nine objects	<i>R</i>	68.5	14.2	17.3	61.6	15.8	22.6
		<i>W</i>	29.4	20.1	50.5	36.9	15.1	48.0
	Tree	<i>R</i>	13.3	14.0	72.7	20.0	13.3	66.7
		<i>W</i>	78.2	13.5	8.3	76.9	12.8	10.3
	Nine objects	<i>R</i>	85.9	3.8	10.3	82.2	5.1	12.7
		<i>W</i>	25.0	12.7	62.3	30.0	9.1	60.9
6;0-8;7	Tree	<i>R</i>	8.6	0.0	91.4	29.0	0.0	71.0
		<i>W</i>	87.8	4.0	8.2	93.7	4.2	2.1
All S's	Nine objects	<i>R</i>	77.2	9.0	13.8	71.9	10.4	17.6
		<i>W</i>	27.2	16.4	56.4	33.4	12.1	54.4
	Tree	<i>R</i>	11.0	7.0	82.0	24.5	6.6	68.8
		<i>W</i>	83.0	8.8	8.2	85.3	8.5	6.2

disagreement, and *?*, for *doubtful*. The data regarding the *tree* and the other nine objects are separately entered and each group is again divided according to whether the response to the question of animation is *right* (*R*) or *wrong* (*W*).

It is at once evident that, in the instance of the nine objects, the agreement is high for the *R*-category (77.2% for *living* and 71.9% for *having life*) and low for the *W*-category (27.2% and 33.4% correspondingly). Consistently with this in significance is the fact that for the *tree*, on the contrary, the agreement is low for the *R*-category (11.0% and 24.5% respectively) and high for the *W*-category (83.0% and 85.3% respectively). Agreement in the former case and disagreement in the latter mean likewise adequate appreciation of the true status of the objects. An unanalysed total would have been most misleading. The facts prove that, when the child describes a thing as alive, he is in no way indiscriminately committed to ascribe to it the anthropomorphic characteristics. He may be led to misuse the term "living," but his understanding regarding the properties of things remains on the whole adequately differentiated.

Piaget has compared children's developmental status in the concept of animism and that of consciousness and found that 40 per cent of the children examined belonged to the same stage in both series. (4) Russell has found a correspondence of 63 per cent between the stage in animism and that in "valid concepts." (5) Now we begin to wonder whether these data include many children who belonged to the highest stage of development in both classes of concepts. For, if very many of the children were perfectly informed about the living and the non-living, the total correspondence would be high, but inference therefrom of general internal consistency of children's animistic conception would be spurious.

The tendencies outlined above, already marked for the younger group of subjects, become more accentuated for the older.

Finally, the agreement of answers for *living* and *having life* is directly examined. The instances of agreement average only 61.4 per cent for the younger children, but increase to 80.3 per cent for the older.

The percentages of agreement for the individual objects are as follows:—*dog* (100%), *pencil* (90.4%), *stone* (87.8%), *river* (82.8%), *moon* (69.4%), *ball* (67.4%), *tree* (63.0%), *automobile* (53.5%), *bicycle* (53.4%), and *watch* (40.6%).

D. CONCLUSIONS

1. An inanimate object is said to be alive only in a small proportion of cases.
2. Even when such an erroneous claim is made, the object is *not*, in the large majority of instances, credited with anthropomorphic traits. Knowledge about traits is in general more advanced than judgment regarding animation.

3. The distribution of correct answers among the different objects seems to indicate that animistic concepts, where present, are to be explained by the apparent characters of the specific object rather than by any general tendency.

4. Of the anthropomorphic traits, *pain* is the best understood and *purpose*, the least. *Function* is often confused with utility.

5. The terms "living" and "having life" do not agree in usage for the children, the former being more loosely applied than the latter.

6. Correct answers and agreements among the different concepts tend to increase with age (except in the special case of the *tree*). Vague, ambiguous answers tend to decrease with age.

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FURTHER COMPARATIVE DATA ON REPETITION-CHOICE AFTER SUCCESS AND FAILURE AS RELATED TO FRUSTRATION TOLERANCE*

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In an earlier study (1) it was found that young children (4 to 7 years) prefer their previous successes while older ones (11 to 14 years) prefer previous failures for repetition if given a choice. Subjects of intermediate age (8 through 10) were more randomly distributed with respect to repetition-choice. The findings were construed as indicating a trend in social development in which a growth of "pride" led gradually, in keeping with the Freudian reality principle, to a need for vindication after failure; the very young child was conceived to respond with less personal involvement to the so-called failure and hence to indulge without compunction, according to the pleasure principle, his previous pleasant experiences. Since these first findings were obtained from a group of only 37 children and since these subjects were all physically handicapped, a definite need for further evidence remained. In this report results from approximately 250 new subjects, including 106 normal children, will be presented.

The discussion of this material will also make possible a reconsideration of the earlier interpretation of results. It will be pointed out that repetition-choice may be viewed not only from the standpoint of growing socialization in a competitive milieu or of a transition from the pleasure to the reality principles, but may be seen to reflect, however glimmeringly, the development of frustration tolerance (2,3). The choice of failure rather than success for repetition may be taken to indicate a higher degree of the capacity for sustaining tension.

NORMAL CHILDREN

The results obtained with a group of 70 normal Worcester school children, boys and girls, ranging in age from 4-3 to 14-4 may be first reported.¹ These subjects were tested by the same procedure used in the previous study. They were individually given two five-piece jig-saw puzzles to put together

*Received in the Editorial Office on May 29, 1943.

¹The writer acknowledges with gratitude the assistance of Miss Esther Kloop who tested both this group of subjects and the 10 problem children discussed below.

competitively ("to see how much better than the other children you can do"), allowed to complete one but not the other, and then asked which, if either, was preferred for repetition. The puzzles were presented, as regards the arrangement of the pieces, so as to vary roughly in difficulty of solution according to the age and presumed ability of the subjects. As in the previous study, the order of success and failure and of particular puzzle were alternated to rule out systematic errors. Since seven of these children were uncertain or uncoöperative in their choices, only the findings from the remaining 70 will here be presented. Of these 70, 36 or 51 per cent preferred the successful puzzle, 34 or 49 per cent preferred the unsuccessful one. The mean chronological age of the former group was 7-6, of the latter 11-4. Yule's coefficient of association (Q), with repetition of success or failure and age below or above the mean for the group as the dichotomous variables, is .76. The mean MA of those preferring success was 7-9, of those preferring failure, 12-0. The value of Q is .68. The results are thus substantially in agreement with those obtained with the 37 physically handicapped children.

Another group of 36 normal children, boys and girls, in the schools of Malden were studied under somewhat different conditions. The subjects ranged in age from 5-8 to 7-4. The attempt with them was to determine, among other things, whether the presence of the experimenter at the time of repetition-choice affected the results. These subjects were accordingly put through the same procedure as the others but immediately after the two puzzles had been attempted and were lying on the table in front of the child, the experimenter left the room on a pretext with the remark, "You may play with the puzzles if you want to while I am gone." Through an observation window it was possible to see what the child's spontaneous resumptive behavior was. Of the 36 subjects, 10 resumed neither puzzle, 17 repeated the success, and 9 the failure. The mean CA for these groups are practically identical (6-3, 6-3, 6-4) but this result is not surprising since the age range covers only approximately a year and a half². The subjects were, in fact, selected within a range where the repetition of success was, according to the previous findings, expected to predominate. That half of these younger children preferred the success is consistent with the results obtained from the Worcester group. Since, moreover, 10 of the Malden subjects resumed neither puzzle and only 9 chose to repeat the failure, the findings are, from the standpoint of self-vindication, even more positive than the figure for repetition of success would by itself indicate. As regards the variation in

²The Malden subjects were not given intelligence tests and mental ages are therefore not reported.

technique followed with this group, the high proportion of non-resumption and preference for failure may indicate that choice of the success is to some extent encouraged by the presence of the experimenter in subjects of this age range. Left by themselves they may somewhat more courageously choose the previous failure or more indifferently resume neither task. But the difference in results introduced by this variation of procedure is far less significant than the confirmation of the young child's definite attraction for the successfully completed task which it yields. It must not be forgotten that the preferential repetition of the success is not merely a negative indication that social pride is lacking; it is in itself direct evidence of a pride in achievement or mastery which, while perhaps genetically earlier in origin, is equally definite in its manifestations. This distinction is important even if it is subordinate in the following discussion to an interest in those developmental aspects of personality that put the self-vindictive trends in the foreground.

PROBLEM CHILDREN

A small group, 10, of problem children ranging in *CA* from 5-6 to 14-0 were tested at the Worcester Child Guidance Clinic. Of these subjects six preferred the success, four the failure for repetition. The former group had a mean age of 8-1, the corresponding figure for the latter being 12-5. The number of subjects here in question is obviously too small to warrant generalization but by comparison with the average chronological ages for the success and failure groups among normal children, the possibility of a retardation is here suggested as a lead for further study.

MENTALLY DEFICIENT SUBJECTS

In a meagre sample of mentally deficient children, 12, with chronological ages between 15-6 and 16-5 but with mental ages ranging from 4-8 to 9-2, repetition of the success was found in five cases, of the failure in seven. The mental age difference between the two groups was not great—a mean of 6-9 for the former and 8-0 for the latter—but what difference there was pointed in the expected direction. Pride ratings assigned by individuals well acquainted with the subjects in daily routine yielded a more striking differentiation. Those who preferred success for repetition averaged $+.40$; those who preferred failure, $+1.74$. (The pride scale, which referred to both pleasure in one's own achievements and desire to stand well in comparison with others, ran from -3 to $+3$.) Further study of subjects with

mental deficiency is much to be desired since they would offer an opportunity of varying either *CA* or *MA* while holding the other variable constant. In this fashion the relative effect of the two factors in determining repetition-choice could be compared in order to shed light on the part which the maturation of intelligence as distinguished from more dynamic aspect of personality may play in the process of motivational development.

NORMAL ADULTS

This group consisted of eight undergraduates of Harvard University. It seemed pointless to continue with large numbers since the findings were so uniform and unequivocal. The procedure followed was essentially that already described except that the two puzzles employed were of much greater difficulty and were presented in the guise of an intelligence test. Choice was not verbally elicited but was allowed to appear spontaneously as in the technique used with the Malden children. The result in every case was an immediate preference for the puzzle on which failure had been experienced; in most instances the choice was manifested even before the experimenter had time to leave the room. The findings thus indicate that in normal adults preference for the failure, presumably in the interest of self-vindication, is the rule. (It has, of course, not been overlooked that other results might have been obtained had the puzzle on which failure was experienced differed obviously and markedly from its mate in difficulty. With all subjects the aim of the procedure was to guard against this pitfall by employing puzzles that could be solved with about equal ease.)

MALADJUSTED ADULTS

A group of 45 soldiers with various mental disorders ranging from Simple Maladjustment to the various types of Schizophrenia were tested for repetition-choice as an incidental part of a larger study. The subjects were in this instance directly asked for repetition-choice instead of being left alone to manifest their preferences casually. The technique was included chiefly for its value in establishing rapport for certain more clearly verbal examinations to follow. It was also expected to yield certain qualitative observations of reaction to success and failure that might be correlated with the results of other included procedures. The numbers of these subjects falling into the various diagnostic categories are too small for separate treatment, but the general finding is of interest. As a group these men were distinctly more variable in their attitudes toward choice than the normal adults above des-

cribed. The quantitative findings differed similarly. Of these maladjusted soldiers 31 preferred the failure for repetition, 7 the success, and 7 chose neither. Fourteen, or 31 per cent, thus resembled young children in their lack of drive toward self-vindication. It should be borne in mind that all of these subjects were sufficiently coöperative to take the test up to the point where the question of choice arose. The findings are therefore of genuine interest for repetition-choice and not merely a reflection of general apathy or uncoöperativeness. As compared with the previously reported, although scanty, indications from the group of problem children, the present trend points likewise to a retardation or reduction in motivational status.

SCHIZOPHRENIC ADULTS

The final group of subjects to be considered consisted of 28 coöperative male schizophrenic patients at the Worcester State Hospital. Twelve of these patients were of the paranoid sub-type; the others were hebephrenic [8], simple [2], or indeterminate [6]. The distinction between the paranoid schizophrenics and the others is important since clinically the former are considered to have a more intact personality structure as regards the social pride and competitiveness previously discussed. It would hypothetically be expected that in the present test they would behave more like normal adults than would schizophrenics of other sub-types. The latter would be expected to function more like young children. The procedure followed was essentially the same as that already described for the maladjusted adults. The results were that of the 28 subjects, 10 preferred to repeat the success, 17 the failure, and one chose neither. Taken as a whole this group is thus distributed in a pattern resembling that already reported for the maladjusted adults. Here, too, the preferential repetition of success is excessive for adults though the majority chose failure. When the paranoid patients are considered in contrast to those of the other sub-types, it is found that only two of them preferred the success, nine the failure—a result not far from normal; while of the others, eight preferred the success, and eight the failure. The hypothetical expectation is borne out. Even though the paranoid subjects as a group are somewhat higher in intelligence than the other patients here in question, the mean *MA* difference between those schizophrenics who preferred success and those who preferred failure for repetition is negligible. The personality factors that have already been alluded to appear to throw more light on the difference in results. Further study

with a larger group of patients is, however, needed before valid conclusions can be drawn.

SUMMARY AND CONCLUSION

The foregoing results confirm and extend the previous work on repetition-choice after success and failure. The present study of normal children indicates that, as was found before, those under seven years characteristically prefer success, while those above 11 prefer failure for repetition. Those within the intermediate age range vary according to the individual personality. In the group as a whole, however, from ages 4 to 14 there is a discernible upward trend of a rather consistent sort in the direction of choosing failure instead of success. The results obtained with the problem children suggest a possible retardation in this progressive trend that is worthy of further investigation. The work with the feeble-minded group represents a similar beginning, in this case from the standpoint of isolating the closely related variable of chronological and mental age as factors in repetition-choice. The uniform results from the small group of normal adults, where failure was consistently preferred, indicate that the shift from success to failure reaches a more or less stable level after the age of 13 or 14. Where, however, maladjustment is found in adults, as in the 45 soldiers with mental disorder and in the group of 28 schizophrenic patients, a tendency for repetition of failure to lapse appears.

The shift from success to failure in repetition-choice in the course of development seems to represent an increase in sensitivity to certain competitive aspects of socialization. Pleasure in past achievement becomes subordinated to social failure where present. Concurrently the capacity to sustain the tension associated with failure and to delay gratification appears to develop. The shift in repetition-choice thus reflects, however modestly, the growth of frustration tolerance (2,3).

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Note. Much of the experimental work here reported was conducted at the Worcester State Hospital and Clark University, Worcester, Massachusetts.



ANOTHER STUDY OF RETESTS WITH THE 1916 STANFORD-BINET SCALE*

School District of the City of Erie, Pennsylvania

ZOE ISABELLE HIRT

A. INTRODUCTION

In 1905 when Alfred Binet gave to the Paris School System his *Method of Measuring the Development of Young Children*, he sounded a warning against some of the fallacies that have since menaced the value of its use. He defined an individual's attained intelligence in terms of years of mental age, but he tried to guard his idea from abuse by the statement:

It is intended that these diagnoses are of value only for the present moment. He who is imbecile today may perhaps become feeble-minded as he grows older, or, on the contrary, remains an imbecile all his life. One cannot tell; the prognosis must be reserved (1).

The practice in our country of defining a person's intelligence level in terms of a single value, viz., the ratio between his chronological age and his mental age, and the popular acceptance of this Intelligence Quotient as a static value, have led to some of the very mistakes from which Binet tried to guard his concept.

During the past three decades there have appeared hundreds of critical studies of the various Binet-Simon revisions, and of results obtained from their use. These studies, as well as widespread clinical practice, have left no grounds upon which to sustain the hypothesis that the Intelligence Quotient is a static value.

There is no claim that the present study of what happens to *IQ*'s is unique in the field of psychological research. There are, however, certain facts and conditions inherent in peculiar combinations which may make the study a slight contribution in answer to some of the questions propounded by the multitude of investigators.

B. THE CHILD STUDY DEPARTMENT OF THE ERIE SCHOOL DISTRICT

This organization within the Public School System functions primarily in the interests of pupils having difficulties serious enough to interfere

*Received in the Editorial Office on May 29, 1943.

with satisfactory school adjustment and achievement. The Child Guidance Clinic and the Division of Special Classes are subdivisions of the Department. The staff consists of six full-time workers with office headquarters in the Annex to the Administration Offices of the School District.

The school psychologist serves as director of the Department. The supervisor of special classes has oversight of the special classes, including orthogenic, orthopedic, sightsaving, speech correction, lipreading, and class for the deaf. The visiting teacher for the Child Guidance Clinic prepares case histories, arranges Clinic schedules, and attempts to secure the fulfillment of the neuropsychiatrist's recommendations. The visiting teacher for the schools aims to serve as school and home counsellor when the facts in the case point to the child's environment as the main source of his difficulty. A chief clerk has charge of the office suite, supervises the making and filing of records, and serves as stenographer for the Child Guidance Clinic. An assistant clerk types and files records, scores group tests and tabulates the results, and gives stenographic service to workers in the Department.

School principals, teachers, supervisors, visiting teachers, family physicians, medical inspectors, school nurses, visiting nurses, parents, guardians, probation officers, attendance officers, social workers, Federal Employment Office, State Bureau of Rehabilitation, and the Red Cross Office refer individuals for psychological examination. Not infrequently high school students come seeking educational and vocational advice. In practically every case referred to the Child Study Department, a psychological examination is given early in the investigation of the problem. If the facts furnished by the referring agent, school records, and psychological tests, warrant neuropsychiatric examination, the individual is referred to the visiting teacher for the Clinic who sets about procuring a case history, compiled according to approved psychiatric standards. Without cost to the School District, for the past 20 years, the Warren State Hospital has sent to Erie, for two or three days of each school month, a member of its staff to examine children brought to the Child Guidance Clinic. The psychologist, the visiting teachers, and the supervisor of special classes act as consultants with the psychiatrist in the Clinic.

If the psychological examination reveals handicaps so serious that the pupil cannot profit by regular classroom instruction, transfer to an orthogenic class is recommended. Such placement is made, however, only when the psychologist's recommendation is endorsed by the principal of the school where the pupil has been enrolled. Transfers to orthopedic and sightsaving classes are made on recommendation of medical inspectors or other physicians.

Referrals for lipreading instruction are made by the member of the medical inspection staff who has charge of the administration of audiometer tests to all pupils in the School District in Grades II to XII inclusive. Classroom teachers refer pupils for speech correction instruction. Lipreading and speech correction are taught by itinerant instructors who serve children in all of the schools.

C. THE GROUP INCLUDED IN THIS STUDY

All of the 3,002 tests included in this investigation were given by the same examiner between January 4, 1924, and September 24, 1942. All of the tests were given either in a school building, or in the headquarters of the Child Study Department. The examinations were made in all cases primarily to help teachers, parents, and others, to understand the children better. The study includes all of the individuals with whom the 1916 Stanford Revision of the Binet-Simon Tests was used more than once as an instrument of psychological investigation. With practically all of them various other measuring devices were used in connection with the Binet Scale. The variety included numerous performance tests and group intelligence tests, and in many cases the results of standardized achievement tests were taken into consideration in making diagnoses and recommendations. However, this investigation is concerned primarily with the results of examinations with the 1916 Stanford-Binet Scale. The complete scale was used in all cases.

With approximately 50 per cent of these pupils, the major reason for the initial referral to the psychologist was unsatisfactory school achievement. With about 30 per cent, the reasons given for referral included undesirable conduct, vocational or educational guidance, foster home or institutional placement, serious speech disorder, excusal or exclusion from school. In a sense, all referrals were made to determine mental status, but that was listed as the major reason for referral when teachers, parents, and social workers came seeking better understanding of children who were not necessarily retarded or delinquent, and when superior children were referred just to find out how far above the average they ranked. About 20 per cent of the individuals were referred for their mental status to be determined.

In this investigation no statistical attempt has been made to discover sex differences in the problems presented. It is a significant fact, however, that in the entire group of 1,357 subjects, there are 942 boys and 415 girls, a ratio of $2\frac{1}{4}$ to 1. In Monroe's investigation of reading disability, she found that in the group of retarded readers the ratio of boys to girls was as $3\frac{1}{2}$

to 1 (2). Since difficulty with reading is a major cause of unsatisfactory school achievement, this is a plausible explanation of the predominance of boys among pupils referred to the school psychologist. It is also a fact that girls mature more rapidly than boys. There has been gathered considerable evidence that at birth boys generally have larger heads than girls, and this fact leads to the suggestion that with many boys who have difficulty in learning to read, there may be present a mild degree of cerebral palsy.

Not only in the group included in this study is there a large majority of boys, but in the entire number of 9,796 subjects examined from one to eight times each by the psychologist in Erie, through September, 1942, there were 6,144 males and 3,652 females.

D. THE PURPOSE OF THE STUDY

Twenty years ago, in discussing the constancy of the *IQ*, Teagarten said: "What we probably need most right now is an intelligent evaluation of individual *IQ*'s before we can make intelligent comparisons of *IQ*'s" (3). The writer has spent more than 25 years evaluating *IQ*'s in the light of all the other available facts concerning school children, and now it seems desirable to apply the statistical method of review to determine what has happened to the *IQ*'s of this particular group of individuals who have been examined from two to five times. As we pursue the investigation we find ourselves reverting time and again to the method of individual consideration and diagnosis, for it is remarkable how *IQ*'s become personified in the thinking of the examiner.

E. THE STUDY

The 26 children under six years of age at the time of their first examination were referred by child-placing agencies, by parents, or kindergarten teachers. This number is a very small percentage of young children who have been examined by the school psychologist, but with the others, the 1916 Stanford-Binet Scale was not used for reexamination. Nearly one-third of the children were eight or nine years old when they were first examined.

Table 2 distributes the examinations according to the ages of the subjects when they were first referred and the number of times they were examined. Since unsatisfactory school achievement was the major reason for referral in half of these cases, and since reexaminations were called for in most cases because more or less serious problems of one type or another persisted, this study deals with a group that is, in a large measure, selected.

TABLE 1
NUMBER OF INDIVIDUALS FIRST EXAMINED AT EACH AGE

Chronological age																	
Age in years	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
No. of pupils	1	2	7	16	87	176	223	222	184	167	129	82	36	20	3	2	1,357

TABLE 2
DISTRIBUTION OF THE NUMBER OF EXAMINATIONS ACCORDING TO AGE AT TIME OF FIRST EXAMINATION

Age range		No. of examinations				Total No. examined
		2	3	4	5	
1 yr. 11 mos. to 2 yrs. 5 mos.		1				1
2	6	— 3	5	2		2
3	6	— 4	5	7		7
4	6	— 5	5	13	1	16
5	6	— 6	5	64	16	87
6	6	— 7	5	125	41	176
7	6	— 8	5	174	45	223
8	6	— 9	5	188	29	222
9	6	— 10	5	147	33	184
10	6	— 11	5	136	28	167
11	6	— 12	5	111	18	129
12	6	— 13	5	78	4	82
13	6	— 14	5	36		36
14	6	— 15	5	20		20
15	6	— 16	5	3		3
16	6	— 17	5	2		2
Totals		1,106	217	31	3	1,357

Total No of examinations—3,002.

Table 2 shows that 1,101, or 81 per cent, of the 1,357 subjects who were examined from one to five times were between the ages of 6 years 6 months and 12 years 5 months when first examined. According to Table 3, these 1,101 had *IQ*'s between 20 and 189 when they were first examined. This table also shows that of all the individuals examined between the ages of 2 years and 17 years, 1,116, or 82 per cent, had *IQ*'s between 60 and 94 when they were examined the first time.

In Table 5 the percentages of the total number of the cases in the first and last examinations, minus and plus variations summed, are computed. It will be seen that with over 46 per cent of the subjects the *IQ*'s varied less than 6 points, while with almost three-fourths of them the variation is less than 11 points. Less than 10 per cent changed more than 15 points.

TABLE 3
DISTRIBUTION OF *IQ*'s AT FIRST EXAMINATION ACCORDING TO AGE WHEN FIRST EXAMINED

Intelligence Quotients																	
Age in years	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	
2																	
3																	
4							1			1	1		1		1		
5						1		1		1	2	1	2	1	1	2	
6				1		3	4	1	3	5	9	10	14	13	6	6	
7						1	7	5	3	10	17	24	30	27	14	16	
8				1	1		3	2	12	14	24	42	40	23	29	14	
9			1	1	1	3	4	4	6	12	33	35	46	31	20	7	
10					1		3	4	9	23	26	35	31	29	9	10	
11						2	1	5	16	14	27	32	38	14	10	6	
12	1						3		10	27	23	34	11	12	2	2	
13							6	4	12	18	21	12	5	3		1	
14									4	5	6	3	10	4	1	2	
15									2	2	4	5	5	1			
16																	
17									2							1	
Total	1	2	3	3	11	32	35	78	135	191	240	223	155	94	65		

TABLE 3 (continued)

Age in years	100 104	105 109	110 114	115 119	120 124	125 129	130 134	135 139	140 144	145 149	150 154	185 189	Total No. pupils
2								1					
3				1				1					2
4					1					1			7
5	2						2						16
6	9	2			1								87
7	14	3	2		1				1			1	176
8	11	3	2	1	1							.	223
9	8	3	1	2	1		1	1		1			222
10	1		1	2									184
11	1												167
12	2	1						1					129
13													82
14													36
15	1												20
16													3
17													2
Total	49	12	6	6	4	1	3	4	1	1	1	1	1,357

TABLE 4
DISTRIBUTION OF *IQ*'s AT LAST EXAMINATION

<i>IQ</i> 's	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
	24	29	34	39	44	49	54	59	64	69	74	79	84	89	94	99
No. of pupils	1	2	5	4	3	33	45	76	132	214	226	199	170	94	62	36

TABLE 4 (continued)

<i>IQ</i> 's	100	105	110	115	120	125	130	135	140	145	150	155	160	180	Total
	104	109	114	119	124	129	134	139	144	149	154	159	164	184	
No. of pupils	21	12	8	5	2	2				1	1	1	1	1	1,357

TABLE 5
FREQUENCIES OF DIFFERENCES IN *IQ*'s IN FIRST AND LAST EXAMINATIONS

IQ variation	No.	Percentage	Cum. No.	Cum. percentage	Changed
0 points	70	5.17	70	5.17	0 points
1 to 5 points	560	41.25	630	46.42	less than 6 points
6 to 10 points	375	27.62	1,005	74.02	less than 11 points
11 to 15 points	218	16.10	1,223	90.11	less than 16 points
16 to 20 points	85	6.27	1,308	96.38	less than 21 points
21 to 25 points	27	1.99	1,335	98.37	less than 26 points
26 to 30 points	15	1.11	1,350	99.48	less than 31 points
31 to 35 points	5	.37	1,355	99.85	less than 36 points
36 to 40 points	2	.15	1,357	100.00	less than 40 points

The findings here approximate those of the Manns in their retests of juvenile delinquents (4), although they used the 1937 Revision for retests.

In Table 6, the individual differences in *IQ* are distributed in intervals of 5 points, in both directions from 0, or no change, in the first and last examinations. The greatest *IQ* difference is a drop of 38 points which occurred in the case of a girl who was first examined at the age of 8 years 3 months when her mental age was 5 years 7 months, *IQ* 68. When she was last examined, she was 17 years 10 months old and her mental age was 4 years 9 months, *IQ* 30. She was examined in the Child Guidance Clinic when she was 9 years 10 months old, and the diagnosis was "epilepsy secondary to organic lesion."

The greatest increase included in Table 6 is 28 *IQ* points in the case of a crippled boy of Czecho-Slovakian parentage. Andrew was 16 years old when he applied for admission to the orthopedic class when it was being organized in October, 1925. He had attended a foreign language parochial school for six years and had been moved along to the sixth grade. In addition to his very defective extremities, psychological examination revealed mutilated speech with a meager knowledge of the English language, poor vision, a shrinking, withdrawn personality, and an *IQ* of 58. Reexamination after he had been in the orthopedic class for 4 years 6 months, revealed an *IQ* of 86.

In all cases included in this study, 16 is used as the divisor for ages above 16 years.

In Table 7 the individual *IQ* differences in all reexaminations are distributed in intervals of 5 *IQ* points, in both directions from 0, or no change, as the midpoint of one interval. The mean difference is 5.08 points and the standard deviation is 8.26 points.

There is not a great deal of difference between the number of plus and

TABLE 6
FREQUENCIES OF VARIATIONS OF *IQ*'s AT DIFFERENT *IQ* LEVELS IN FIRST AND LAST EXAMINATIONS

<i>IQ</i> levels	No.	-40	-35	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30
100-136	88	1	2	4	5	9	17	13	16	6	10	0	3	0	1	1
80-99	538	0	2	4	15	43	97	132	130	21	60	23	6	2	1	2
20-79	731	1	1	3	4	27	78	152	216	43	128	55	17	4	1	1
Total	1,357	2	5	11	24	79	192	297	362	70	198	78	26	6	3	4

TABLE 7
FREQUENCY OF VARIATIONS OF *IQ* AT DIFFERENT *IQ* LEVELS IN ALL REEXAMINATIONS

	-40	-35	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	Total
No.	1	2	10	19	60	175	295	430	385	176	64	24	1	2	1	1,645

minus variations in reexaminations within a year, but thereafter the minus changes greatly outnumber the plus changes. There are about three times as many minus as plus changes among the total number of reexaminations. In 5 per cent of all reexaminations there is no *IQ* change. Table 6 shows that there is no *IQ* change in 5 per cent of the cases when only the first and last examinations are compared. In 764 cases, or 46 per cent of all reexaminations, there are not more than 5 *IQ* points of change in any individual case, and Table 5 shows that the same is true in comparing only the first and the last examinations.

In Town's study of retests made over a 12-year period at the Psychological Clinic of the Children's Aid Society of Buffalo, 5.5 per cent of the individuals reexamined showed periods of apparent arrest in development during which the mental age remained fixed through two or more successive examinations (1). In his study of the results of multiple Binet retestings of the same two subjects over a period of 15 years, Wallin reports similar periods of arrest (5).

In the present study, among the 1,645 reexaminations there are 82 individuals, or 6 per cent of the total number, who show no change in mental age level during intervals ranging from 6 months to 10 years 5 months. The arrest of mental development can be accounted for in a good many instances, as with the epileptic girl already referred to. With a great many others there is no explanation, unless it be that the individuals reached plateaus of mental development where they remained for varying periods of time. In still other cases it looks as if the individuals reached the limit of their potential development, at least as far as the measuring instrument could determine. That such was not really the fact is proved by the fortunate social adjustment that some of these same folks have made in their adult community. They have kept on growing along lines that cannot be determined quantitatively by any scale thus far devised.

Terman suggests the following classification of intelligence quotients (6) (Table 9).

Using Terman's suggested classification, Figure 1 shows the number and percentage of changes, comparing the *IQ*'s in the first and last examinations. In 62 per cent of the cases the classification is unchanged, in 33 per cent of the cases the classification is lowered, in 5 per cent of the cases the classification is raised.

As a matter of fact, however, the term feeble-mindedness is not found very often among the records of the individuals included in this study, since we adhere to Doll's (7) definition of the term, viz.:

TABLE 8
VARIATIONS OF *IQ*'s IN ALL EXAMINATIONS, DISTRIBUTED ACCORDING TO HALF-YEAR
INTERVALS BETWEEN EXAMINATIONS

Intervals between examinations												
<i>IQ</i> change	6 mo. to 11 mo.	1 yr. to 1-5	1-6 to 1-11	2-0 to 2-5	2-6 to 2-11	3-0 to 3-5	3-6 to 3-11	4-0 to 4-5	4-6 to 4-11	5-0 to 5-5	5-6 to 5-11	6-0 to 6-5
Plus	65	65	54	51	30	37	18	19	16	11	6	4
Minus	75	103	112	127	114	124	96	94	63	70	48	34
None	17	19	12	12	6	6	2	2	2	4	0	2
Total												
No. re- exams.	157	187	178	190	150	167	116	115	81	85	54	40
No. less than 6 points change	105	122	106	108	68	72	37	43	24	31	10	8

TABLE 8 (continued)

Intervals between examinations														
<i>IQ</i> change	6-6 to 6-11	7-0 to 7-5	7-6 to 7-11	8-0 to 8-5	8-6 to 8-11	9-0 to 9-5	9-6 to 9-11	10-0 to 10-5	10-6 to 10-11	11-0 to 11-5	11-6 to 11-11	12-0 to 12-5	12-6 to 12-5	Total
Plus	4	2	4	3	1	2	0	1	0	0	0	0	0	393
Minus	32	18	12	9	12	6	8	3	1	1	1	0	1	1,164
None	1	1	0	0	1	0	0	1	0	0	0	0	0	88
Total														
No. re- exams.	37	21	16	12	14	8	8	5	1	1	1	0	1	1,645
No. less than 6 points change	15	4	2	2	3	3	0	1	0	0	0	0	0	764

TABLE 9

<i>IQ</i>	Classification
Above 140	"Near" genius or genius
120 to 140	Very superior intelligence
110 to 120	Superior intelligence
90 to 110	Normal, or average, intelligence
80 to 90	Dullness, rarely classifiable as feeble-mindedness
70 to 80	Borderline deficiency, sometimes classifiable as dullness, often as feeble-mindedness
Below 70	Definite feeble-mindedness

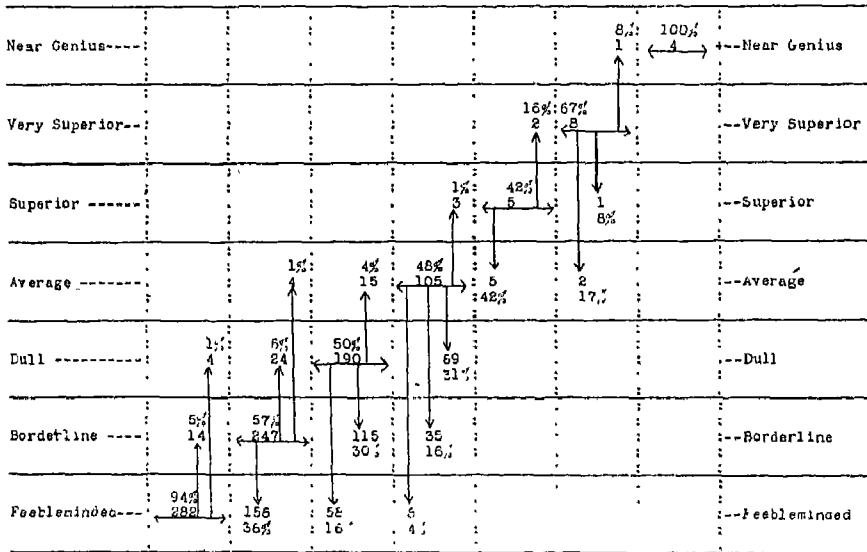


FIGURE 1

CHANGES IN CLASSIFICATION INDICATED BY *IQ*'s IN FIRST AND LAST EXAMINATIONS

Mental deficiency is a state of incompetence obtaining at maturity, or likely to obtain at maturity, resulting from developmental arrest of intelligence because of constitutional (hereditary or acquired) origin; the condition is essentially incurable through treatment, and unremediable through training, except as treatment and training instill habits which superficially compensate for the limitations of the person so affected while under favorable circumstances, and for more or less limited periods of time.

In only rare instances is there available to the school psychologist the means of determining whether there are present all of the criteria included in Doll's definition. This study furnishes evidence that "the prognosis must be reserved." Figure 1 shows that in 1.33 per cent of the cases what the first *IQ*'s alone would have indicated as feeble-mindedness, upon re-examination, later appeared as borderline deficiency or dullness. But we have no evidence in our experience that "the *IQ*'s of children have possibilities of change over a large portion of the *IQ* range from genius to feeble-mindedness" (8). Of the 300 children who had *IQ*'s below 70 in their first examination, 282, or 94 per cent, still had *IQ*'s below 70 when they were last examined.

F. DISCUSSION OF INDIVIDUAL CASES

Among the individuals included in this statistical study there are those who demonstrate almost every theory advanced concerning *IQ* changes. Do the *IQ*'s of superior children tend to increase, or do they remain static, or do they decrease? Cases can be selected to prove that they do all of these things.

Case 1. S.R. is the younger member of a fraternity of two. Her brother was 9 years 8 months old when she was born on June 20, 1935. Her unusual vocabulary before she had reached her second birthday made her an attractive subject for psychological investigation. When she was 23 months old, she succeeded with 4 of the 6 items at Year III on the 1916 Stanford-Binet Scale. Assuming that her basal mental age was then 2 years, and her mental age 2 years 8 months, her *IQ* was 137. Six days after her second birthday, she was given Form *L* of the 1937 Revision. Her mental age was 2 years 9 months on that scale, making her *IQ* 138. At the age of 3 years 10 months her Social Quotient was 169 on the Vineland Social Maturity Scale. She was reexamined with the 1916 Scale when she was 5 years 9 months old. During the 46 months that had elapsed since her first examination her mental age had increased 73 months and her *IQ* was 152. On July 10, 1942, S.R. was given the 1916 Test for the third time. During the preceding 16 months her mental age had increased 32 months, adding another 10 points to her *IQ*, making it 162. With a basal mental age of 9 years, she succeeded with additional items distributed as far as the 14-year level. Her responses to the Problems of Fact at Year XIV were:

- a. "A man not alive tied there."
- b. "He was sick, but I don't know what a lawyer does."
- c. "He was pedaling a bicycle."

Her interpretations of the Fables were remarkable for a 7-year-old, justifying a plus score at Year XII:

- A. Hercules and the Wagoner—"He wasn't a real God, or he would be kind and help him."
- B. The Milkmaid and Her Plans—"Don't think about yourself. She should think about what she's doing."
- C. The Fox and the Crow—"Don't steal. You never can keep what you steal anyway."
- D. The Farmer and the Stork—"It teaches us not to go with bad people."
- E. The Miller, His Son and the Donkey—"Don't try to carry such big animals."

Her vocabulary score is now 40 (Year XII). She says that the word *insure* means "to buy insurance so if you are in a crash the company will pay for it." In defining skill, she says: "Barbara Lee has skill—she can play the piano beautifully." Her Social Quotient is now 186.

Case 2. J.D. is another superior child whose *IQ* changed upward. It was 133 when he was 8 years 5 months old, and 2 years and 10 months later, it was 156.

Case 3. E. H. had the highest *IQ* included in this study. When she was 7 years 5 months old, it was 188. Three years later it was 180. She is included in Hollingworth's study of *The Gifted Child*. She maintained high rank throughout her scholastic career, including a year of graduate work at a university. She is now employed on a highly specialized type of work in the office of a huge war production plant. She has won numerous awards for her poems. A literary career is her cherished desire.

Case 4. L.J.'s *IQ* was 151 at the age of 3 years 10 months, and it was 150 when she was reexamined at the age of 7 years 1 month. She is now an artist of note.

But in contrast with these superior children whose *IQ*'s either increased or remained unchanged, there are those who have not fulfilled the promise of their first examination.

Case 5. J.G.'s *IQ* was 137 when he was 8 years 8 months old, and 7 years later it had dropped to 109. During the ten years that have elapsed since his last examination he has proved that he does not have more than average intelligence. At the same time, his hereditary, cultural, and social background and environment are equal to, if not superior to, those factors in the foregoing cases, 1, 2, 3, and 4.

Given an arrest of mental development on a low plane and an unfortunate family background and home environment, is the prognosis as to eventual social adequacy necessarily gloomy? In cases like T.B.'s, no. With those of L.H.'s type, yes.

Case 6. Sixteen years ago, T.B., then 11 years old, was being held in the third grade because he could not read. His mental age was 8 years, his *IQ* 73, and he was becoming an increasingly serious behavior problem, both in school and in the community. His foreign language home environment was unwholesome. His vision was impaired by a strabismus, and one of his upper front teeth had been broken off, giving him altogether the appearance of an embryonic gangster. Placement in a special class wrought a marvelous change in the boy within a few months, but repeated examinations showed an arrest of mental development. At the age of 15 years his

mental age was still 8 years and his *IQ* had dropped to 55. When he was 16 years old he was advised to find a job so that he could withdraw from school. But he wanted to remain in school, saying, "I am just beginning to like reading, and I am going pretty good in arithmetic." He was reminded that he had taken all of the available shop courses. He said that he had learned the barber's trade with a friend after school hours, and he proposed to set up a barber shop in the big Technical High School which at that time housed several special classes for older boys, in addition to the large enrollment of high school boys. It was in the worst years of the depression, and T.B. stated the facts when he said, "A lot of the fellows over there need shaves and haircuts and can't afford to pay for them." He asked if he could not work as a barber in the school while the other boys of his group pursued their various shop courses. His plan was carried out, and during the following two years he was the busiest barber in town during his shop hours at Tech High. School nurses heard of his work and his philanthropic spirit, and he was more than pleased when they called for his services for children in the elementary schools who "needed haircuts and couldn't afford to pay for them." Today, T.B. is a fine appearing young man, his strabismus corrected by glasses, and his teeth in fine repair. His barber shop in the neighborhood where he grew up, is a busy, wholesome place.

Case 7. At age 10 years, L.H. was sitting with a second grade class because he had made almost no progress in learning to read. His mental age was 7 years, and his *IQ* 69, when he was placed in a special class. That was 17 years ago. His American born parents maintained an untidy residence in a poor section of the city, and they gave little attention to the activities and associates of their seven children. L. showed no improvement after his transfer to a special class. His conduct became more and more anti-social. His teachers described him as "restless, inattentive, and quarrelsome." A second psychological examination, after five years, revealed an increase of only 9 months in mental age, with an *IQ* of 51. Physical inspection and neuropsychiatric examination in the Child Guidance Clinic, when he was 12 years old, disclosed nothing to account for his fundamental retardation, or his undesirable behavior. At the age of 16 years, he withdrew from school. Within a year he was arrested on a morals charge, and served 30 months in a State Industrial School. In 1937, he was again arrested when he attempted assaults upon two girls in the vicinity of his home. He was sentenced to an indefinite term in a State Reformatory. A year ago, he was examined by two physicians who diagnosed him as "a dangerous, feeble-

minded individual with criminal tendencies." One day this summer, he was stabbed 17 times by four of his associates in the institution.

The psychological records of T.B. and L.H. illustrate Wallin's conclusion that "the noumenal self is inaccessible to the examiner" (5). The phases of intelligence open to test exploration were strikingly similar with these two boys, but that they themselves were widely divergent types is proved by their present positions in society. According to Doll's definition of mental deficiency, T.B. is not socially incompetent, therefore not mentally subnormal, while L.H., with practically the same *IQ*, is unquestionably feeble-minded.

Do young children with low *IQ*'s make impressive gains when they are placed in fortunate surroundings (8)?

Case 8. In September, 1930, when the psychologist was working in a large orphanage, classifying children for kindergarten and first grade enrollment, L.M. was brought in and placed on a mat on the floor. An estimate of the child's mental equipment had to be based entirely upon observation of her behavior and reports of those responsible for her care in the institution. She had been placed in the orphanage when she was four weeks old, by the family of the 16-year-old unmarried mother. Now, at the age of 21 months, she was unable to raise herself to a sitting position. She lay upon the floor for 15 minutes, with her eyes closed, monotonously raising and lowering her knees. When she was placed in a sitting position on the mat, she maintained her balance, but paid no attention to the outstretched hands of the one who had charge of the nursery, nor to anybody or anything else around her, nor did she attempt to grasp anything placed in her hands. She required about the same amount and kind of attention that was given to a 5-month-old baby in the nursery. A month later she was examined by the neuropsychiatrist in the Child Guidance Clinic and diagnosed as "a low grade defective, probably of about the idiot level," and her placement in the State Training School at Polk was advised. At the same time, the psychiatrist urged that the child be given more personal attention, and that older children in the orphanage be permitted to show her affection and play with her every day. In May, 1933, the psychologist was called upon to review the little girl's case. For about a year, L.M.'s young father had been calling frequently to see her, and they had become thoroughly devoted to each other. Now he was planning to marry the child's mother and establish a home for themselves and their daughter. It was the young man himself who came to the Child Study Department to ask the psychologist to examine L.M. At the age of 4 years 5 months, the little child's mental age was found to be 3 years 2 months, her *IQ* 71. A year later a second

child was born, a boy to whom the mother was devoted, while she persistently rejected her daughter. After a little less than two years the parents separated, the mother taking charge of the boy, and the father taking L.M. to live with him in his mother's home. The bond between the father and daughter became very close, as it continues to be, and the grandmother who is devoted to the girl maintains a good home for her. After three semesters in kindergarten, L. was enrolled in the first grade in September, 1935. In February, 1936, she was transferred to a special class. She was last examined on September 24, 1942. She is now almost 14 years old, and her mental age is 10 years 1 month, her *IQ* 74. She told the examiner that her father was graduated from a State Teachers College in the South in June, 1941, and he is now holding a Federal Government position. The girl reads fluently and with fine comprehension at her mental age level. Her teacher considers her a diligent worker and a reliable member of her group, and her grandmother entrusts her with a good many responsibilities about their home.

Case 9. In the spring of 1929, a negro father down in southern Arkansas, sold his team of mules, his cow, and his hog, and brought his family to live in Erie. L.W. was the oldest of the six children. Where he had lived, the nearest school for colored children was five miles away. Consequently, the boy had attended school less than a year of his whole life of 11 years 6 months. He could neither read nor write a word, and so, to his sore distress, he had been placed in a first grade group to await the attention of the psychologist. In view of his very limited experiences, his *IQ* of 64 was not considered a valid index of his mental equipment. The language of the examiner was almost unintelligible to him, just as his dialect was practically a foreign language to his teacher. His performances with a variety of nonlanguage tests, revealed a fair grade of practical intelligence. He was placed in an orthogenic class in September, 1929. By January, 1932, he had made such remarkable progress that his teacher and the supervising principal of the school proposed to give him a trial in the regular grade organization. The psychologist gave him a battery of achievement tests, and his average test grade was 4A in reading, arithmetic, and spelling. His mental age was then 9 years 5 months, his *IQ* 66. He was placed in a fourth grade class for a trial period. He was 14 years old, but small of stature and immature in appearance, so that he did not look out of place. He was determined to succeed, and no teacher after that ever suggested that he be returned to the orthogenic organization. In December, 1933, when he was completing the sixth grade, his *IQ* was 76 in the National Group

Intelligence Tests. In February, 1934, he was promoted to the junior high school. About that time he was given a third individual psychological examination. His vocabulary score had been 7 in May, 1929, and now it was 43. During the 57 months that had elapsed since his first examination, his mental age had increased 70 months. The addition of 18 points made his *IQ* 82. He withdrew from school in February, 1935, when he was past 17 years old and his help was needed in the support of his family.

But increase in advantages and improvement in environment have not resulted so fortunately with many of the individuals included in this study.

Case 10. Bs. F. and Be. F. are twin boys who can be presented together. When they were infants their parents and six brothers and sisters were killed in an automobile accident. The babies, who had not been with the rest of the family at the time of the tragedy, were taken into the home of a childless couple, superior educationally, culturally, and socially. The foster parents took advantage of every available means of equipping themselves to deal intelligently with their much-loved children, and they began early to make plans for the boys' college education. The principal of the school where the twins attended soon began to suspect their limitations, but it was not until they had shown tendencies toward delinquency that he persuaded the parents to take them to the nearby city for psychological examination. The boys were 13 years 2 months old, and failing in Grade VI, when they were first examined in February, 1930. Bs.'s mental age was then 10 years 1 month and his *IQ* 77, while Be. had a mental age of 8 years 9 months and an *IQ* of 67. Three years later, the Probation Officer of the Juvenile Court brought these boys in for reexamination. The foster father had died before he could be convinced that his sons were mentally deficient, and he had left generous financial provision for their vocational education at a high class trade school. After their father's death, they had robbed their mother repeatedly and destroyed much of her property. She had finally consented to their being placed in a correctional school for a year. She was critically ill when they were released and one of her nephews had petitioned the Court to take charge of the young rogues who were terrorizing the nurse employed to take care of their mother. Psychological examination at that time revealed practically no change in Be's *IQ* which was 68, but Bs's had dropped to 60. These youths were last heard of when they were serving time in the Western Pennsylvania Penitentiary, after having spent a couple of years at a State Industrial School.

G. DISCUSSION OF IMPLICATIONS

With practically all pupils referred for psychological examination because of unsatisfactory school achievement—and with many referred because of undesirable conduct—meager vocabularies, dull language comprehension, and poor reading progress are outstanding handicaps. In almost all instances where reëxamination reveals significant increase in *IQ*'s, there has been marked improvement in language equipment and in reading efficiency.

During a period of years the teachers of special classes in Erie set the development of vocabularies as a major objective in their work. Reëxaminations during that particular period left no doubt as to the value of improved word knowledge in the mental development of slow-learning boys and girls.

Formal reading instruction should be delayed until the pupil has reached a minimum level of social competency and language facility. Teaching rhymes and poetry is not a very effective means to this end. Rare, indeed, is the high school student, referred for psychological examination, who can give an intelligent explanation of the term, "justice," although he has been repeating the Salute to the Flag ever since he entered the first grade.

Poor reading achievement is by no means confined to the area of low *IQ*'s. The volumes that have been written on the subject bear testimony to the prevalence and the complexity of the problem. It cannot be fully solved in the primary grades. With a good many pupils it persists through the elementary grades and on into the secondary school (9).

The state establishes the age at which children shall be admitted to the first grade in school. Then the educational system at once sets up a condition that keeps hundreds and thousands of pupils in that same first grade year after year. Release from the "beginners" class is conditioned upon reading progress, and many children are not physically, mentally, emotionally, or socially able to profit by formal reading instruction until they are several years older. All teachers should be equipped to teach children to read, and non-readers who do not belong in special classes should be promoted with their primers and first readers.

Attempting to force upon a child a skill before he is mature enough to acquire it, does irreparable damage to his personality, as well as to his intellectual mechanism. By the time he is ready to learn to read, his years of failure, and all the distress that accompanies being expected to do the impossible, are inseparably associated with the reading process, and books are shoved completely out of the realm of his interests and desires. Moreover, he may be conditioned to a life of failure.

Pupils placed in orthogenic classes are usually very slow in reaching the level of intellectual development where reading achievement is possible for them. Some of them will not reach that level before they are old enough to withdraw from school. The custom of giving less and less time to the teaching of academic subjects as these pupils advance, may be a serious mistake with many of them. With the primary groups of backward children, formal reading instruction might wisely be omitted from the curriculum; but in the intermediate and advanced classes there are pupils for whom it should have a place of major importance on the program. With all of them, at all times, vocabulary building should be emphasized. Wallin says: "Ample opportunities should be afforded young retardates and deficients in literary subjects, using remedial techniques, concrete procedures, and interest-provoking activity programs, before such instruction is abandoned and the emphasis diverted to motor training" (5).

H. CONCLUSION

1. Although the whole range of intelligence and socio-economic status is represented in this group, unquestionably there are selective factors present, so that it is not a representative sample of the normal school population. Therefore, comparisons may be made only with caution.

2. It is obvious that the great majority of pupils for whom teachers and social workers request repeated psychological investigation, range in mental classification, from mental deficiency to low average, with the majority at the borderline level. From this particular group, 721, or 53 per cent were placed in special classes, including orthogenic, orthopedic, sight saving, speech correction, and lip reading classes.

3. Except in rare cases, *IQ*'s do not remain static, but with individuals who present persistent educational and social problems, the classification implied by the results of the first examination usually either remains the same or changes downward.

4. This study reveals no evidence that the *IQ*'s of children have possibilities of change over a large portion of the *IQ* range from feeble-mindedness to genius. Of the 300 children who had *IQ*'s below 70 in their first examination, 282, or 94 per cent, still had *IQ*'s below 70 when they were last examined.

5. Being a student of language development, Alfred Binet built his test scale on the concept that language is so intimately involved that planes of language development may be used to differentiate levels of mentality. Likewise, the American educational system is grounded in the concept that

literacy is fundamental to school progress. Therefore, the Binet Scale is a satisfactory instrument for educational classification. This study gives clear evidence of that fact.

6. Since more than three-fifths of these pupils were referred to the school psychologist because of unsatisfactory school achievement or undesirable conduct (which is very often associated with scholastic failure) the significance of factors that make for poor school progress seem pertinent to the investigation. With fully one-half of the subjects, inadequate language equipment was evident as a fundamental factor among the causes of retardation.

7. Since the educational system lays primary emphasis upon literacy as an objective in scholastic achievement, the most necessary first step in the educational process should be an exploration of the "beginner's" vocabulary and language comprehension. Education for literacy should proceed from the point where such exploration shows the child to be. The major emphasis should be placed upon social training in the primary grades.

8. Such mental deficiency as may rightly be recognized as the result of social deprivation, is that which exists because of the language poverty in the home and social environment. It might better be called intellectual deficiency. In cases of such deficiency, transfer to an environment rich in intellectual stimulation should have a favorable effect upon the *IQ*'s.

9. The Binet *IQ* is but one item among the evidences of an individual's mental equipment. Interpreted in the light of all other obtainable facts concerning the subject, it is probably, to date, the most valuable single bit of evidence upon which to base mental diagnosis.

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AN EXPERIMENTAL STUDY OF FACTORS ASSOCIATED
WITH STANFORD-BINET *IQ* CHANGES FROM
THE PRESCHOOL TO THE JUNIOR
HIGH SCHOOL*¹

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A. INTRODUCTION

This investigation was undertaken in order to determine which factors in a child's environment are related to changes in rate of mental growth from the preschool to the junior high school level. The study was not made with a view to obtaining crucial evidence on the relative contributions of nature and nurture to mental growth. In the procedure of the investigation no attempt was made to separate environment from heredity. The study was designed, rather, to cut across some of the confusions and arguments in much of the nature-nurture literature and to deal with a single issue of the mental growth problem in a straight-forward manner. A group of children at the preschool level selected as representative of the general population had been examined with the Revised Stanford-Binet Scale. Ten years later, with no contacts maintained in the interim, the same children were reexamined with the same scale. Several factors in the environments of the subjects who had shown the most significant changes in *IQ* were then studied and evaluated. Finally, the subjects who had increased in *IQ* were compared with the subjects who had decreased to determine if there were any factors which differentiated the two groups. We were not concerned with results of extreme combinations of heredity and environment. The question was not, "Given the factors, what will the *IQ* changes be?", but rather, "Given the changes, what were the factors?"

B. SURVEY OF THE LITERATURE

The results on the nature and amount of change in *IQ* which have been

*Received in the Editorial Office on June 22, 1943.

¹This report is condensed from a dissertation of the same title which was submitted to the Graduate School of Stanford University in 1942 in partial fulfillment of the requirements for the Ph.D. degree.

²The writer wishes to acknowledge her indebtedness to Dr. Maud Merrill, Dr. Quinn McNemar, and Dr. Paul R. Farnsworth for their suggestions and assistance throughout the study.

found in previous mental growth studies were summarized in an earlier report (7). The present review will be concerned only with those mental growth studies in which factors related to changes in *IQ* were investigated. It will be limited to results in which the initial test of mental ability was administered at the preschool level—that is, between the ages of two and five-and-a-half years.

Bayley (2, 3, 4, 5) and Bayley and Jones (6) have reported data from the first Berkeley growth study which furnish evidence on the relation between *IQ* changes and various factors. Forty-eight of an original group of 61 children were examined at regular intervals from infancy through nine years. The California Preschool Scale was used from 18 months through the five-year level; the 1916 Stanford-Binet was used at ages six and seven years; the Stanford-Binet, Form *L*, was used at ages eight and nine. That these children represented a selected sample is indicated by the fact that their mean *IQ* at the age of nine years was 129. Bayley checked the mental growth of these subjects against records of past illnesses, ratings of health, measures of physical growth, and ratings of skeletal maturity but failed to find any relation between mental growth and these physical factors. She did find, however, that the magnitude of the correlations between child's intelligence and certain economic and cultural indices increased with the age of the child, thus indicating a positive relation between such factors and mental growth (2). Below 18 months the correlations at successive age levels fluctuated between $-.31$ and $+.20$. Between 18 months and two years the correlations for all of the factors studied showed a substantial increase. Correlations at two years ranged between .30 and .50. Beyond two years little increase occurred in the correlations for social rating, socio-economic status, mother's education, and mid-parent education. The correlations for income and occupation increased in magnitude up to about five years, and the correlation for father's education increased up to 10 years. All of the factors studied were interrelated. Intercorrelations between social rating, income, mother's education, father's education, and occupation ranged from .48 to .74.

Honzik (23, 24) has reported results from the Berkeley guidance study^a which are relevant here. Two hundred and fifty-two children were first examined at the age of 21 months and were re-examined at regular intervals. The mental tests used were the California Preschool Schedules I and II between the ages of 21 months and five years, the 1916 Stanford-Binet at six and seven years, and the revised Stanford-Binet, Form *L*, at eight years.

^aResults from this study have also been reported by Macfarlane (26).

The mean *IQ* of this sample at eight years was 119. Honzik found, as did Bayley in her study, that correlations between child's intelligence and indices of economic and cultural status increased with the age of the child. The magnitude of the correlations for all of the factors which Honzik studied, however, increased beyond the age of two years. For three of the variables, father's education, mid-parent education, and socio-economic index, increases up to seven years were found. At this age the correlations for these three variables were respectively: .40, .40, and .42. Correlations at five years of .59 for rating of mother's intelligence and .35 for mother's education were not exceeded at later ages.

Anderson (1) found, as did Bayley and Honzik, that parental education was related to rate of mental growth. For a group of 100 children, whose mean *IQ* at five years was about 116, the multiple correlation between test scores up to two years and 1916 Stanford-Binet *IQ*'s at five years was raised from .64 to .71 by the inclusion of parental education as one of the variables.

Hallowell (19, 20) made an analysis of factors related to the *IQ* changes of 250 children who were initially examined when they were less than four years old. The initial examination consisted of the administration of several tests. The results of these tests coupled with clinical observations furnished the basis for deriving developmental quotients. These developmental quotients were then compared with *IQ*'s from the 1916 Stanford-Binet administered when the children were between the ages of 4 and 13 years. The median retest *IQ* was 96. Hallowell analyzed the case histories of the subjects for whom the change between developmental quotient and *IQ* had been 10 points or more. She concluded from this analysis that the changes could be attributed to the following causes: poor health conditions, 15 per cent; emotional factors, 10 per cent; environmental situations, 25 per cent; limitations within the tests, 20 per cent; undetermined, 30 per cent.

Wallin (34) analyzed the results of semi-annual examinations made with the 1916 Stanford-Binet of two sisters from the time they were three years old until they were 16 years old. The fluctuations in the *IQ*'s were studied in relation to the following additional data: developmental history; records of colds, infections, illnesses, injuries, and falls; school marks; and notes on inattention and restlessness during the examination. Wallin concluded that changes in *IQ* were not always due to environmental factors. He suggested that fluctuations in physical conditions, restlessness, inattention, and imperfections in construction and scoring of the test all affected the score.

Richards (28) has analyzed the data for individual subjects of the Fels

Research Institute growth study in relation to factors which might accelerate or retard mental growth. The tests used at successive ages were as follows: at age 18 months the Gesell schedules and the Merrill-Palmer Scale; at age 24 months and 30 months the Merrill-Palmer; at three years and thereafter the 1916 Stanford-Binet and, more recently, the revised Stanford-Binet. In connection with analyzing the factors related to changes in *IQ* Richards used the Fels Parent Behavior Rating Scales (10, 11). These scales consist of 30 variables which are rated on a continuous scale with five to seven points of reference. The variables include such factors as adjustment of home, activeness of home, coordination of household, restrictiveness of regulations, disciplinary friction, protectiveness, acceptance of child, and rapport with child. Richards compared mental growth curves which showed acceleration with those which showed retardation and related the differences to differences in ratings on the Behavior Rating Scales. In several instances relationships appeared which suggested that certain parental behavior was favorable to acceleration in mental growth and certain other parental behavior was favorable to retardation.⁴

One other study should be included in this review. It is not a mental growth study, but the method and results are pertinent to the present investigation. Van Alstyne (33) studied the relation between the intelligence of 75 three-year-old children and factors in their environment. The Kuhlmann-Binet and a vocabulary test were given to each child. The Thorndike Test of Word Knowledge was given to the mother of each child to determine the level of her intelligence. The Minnesota Scale for Rating Living Room Equipment was used to obtain an index of socio-economic status of the home. As a basis for constructing a questionnaire regarding environment, 12 judges were asked to name the 10 most important factors which they considered favorable to the mental and language development of three-year-old children. From the 12 lists Van Alstyne prepared the following list of 23 factors arranged in the order of their importance as mentioned by the judges: (1) suitable play material and books; (2) conversation with child by adults; (3) proper physical surroundings and routine; (4) other children in the home; (5) association with other children; (6) good economic conditions; (7) suitable excursions; (8) social atmosphere in the home, visits to others, etc.; (9) responsibility for certain personal and household tasks; (10) reading to the child; (11) parents' use

⁴Except for his paper presented at the 1940 meeting of the American Psychological Association, Richards has not publicly reported his data on the analysis of individual growth curves.

of good English; (12) educational status of parents; (13) stimulation to independent activity; (14) interest of parent in the child's activity; (15) knowledge of level reached by child and interest in his reaching the next stage; (16) careful response to child's questions; (17) child encouraged to express himself verbally; (18) atmosphere of approval and encouragement; (19) parents tell stories to child; (20) both parents well adjusted and happy in their married life; (21) occupation of parents; (22) definite teaching on the part of adults; (23) talking plainly to the child.

Van Alstyne's interviews with the mothers of the children were based on a questionnaire incorporating the above items. In addition, ratings of the child's health, of the child's initial coöperativeness on the Kuhlmann-Binet, and of cleanliness of the child, home, and mother were made. From these data were calculated correlations between each factor and the child's intelligence, and between each factor and the mother's intelligence. It was found that no environmental factor was more highly related to the child's intelligence than to the mother's intelligence. A composite of the environmental factors correlated with socio-economic status to the extent of .68, with child's mental age to the extent of .61, and with mother's intelligence to the extent of .70. The correlation between mother's and child's intelligence was .54. Factors which might be assumed to have some effect on mental growth had no higher correlations with the measures of child's intelligence than did factors which would apparently have no such effect—such as cleanliness, height, possession of own bed, etc. It would seem from Van Alstyne's data that the relation existing between the environmental factors considered and the intelligence of the three-year-old child could be explained by the relation of both environmental factors and child's intelligence to mother's intelligence.

A comparison of the results of the several mental growth studies reviewed shows that they agree in indicating that *IQ* changes are not wholly indeterminate. There are both agreements and discrepancies, however, as to the importance of the variables considered. Bayley believed that physical factors were unrelated to *IQ* changes, whereas Hallowell and Wallin reached the opposite conclusions. Parents' education was found to be an important factor by Bayley, by Honzik, and by Anderson. Bayley and Honzik also found that other socio-economic and cultural factors were related to *IQ* changes. Hallowell gave about equal weight to environmental factors and test limitations as causes of *IQ* changes, and about equal weight to physical and emotional factors. The latter two were given about half as much weight as the former. Richards believed that parental behavior

might be an important factor in changing the course of mental growth. Van Alstyne, in her cross-section study of three-year-old children, found that factors judged to be important in favoring mental development were no more closely correlated with three-year-old intelligence than were factors which would apparently be unrelated.

C. PROCEDURE

1. Subjects

The subjects for this investigation had been examined 10 years previously for the standardization of the Revised Stanford-Binet Scale. In the age range chosen for the present study—two through five and a half years—there had been 213 children examined in California communities. Although a number of these children had moved during the interim, 152, or 71 per cent of the original group, were located. Thirteen of these subjects were eliminated because they had failed more than one item at the two-year, or lowest, age level on both forms of the initial Stanford-Binet examination. This precaution was taken to avoid the possibility of including any subjects whose initial *IQ*'s had been artificially raised. A fourteenth subject was eliminated because his birthdate could not be verified. The elimination of 14 subjects reduced the total number to 138. These 138 subjects formed, according to the age at which they had been initially examined, two groups: the 2- and 3-year group consisted of 52 children who had been initially examined at 2, 2½, 3, and 3½ years of age; the 4- and 5-year group consisted of 86 children who had been initially examined at 4, 4½, 5, and 5½ years of age.

To determine the extent to which the subjects of the retest groups were representative of the 633 subjects of these ages in the standardization sample, a comparison was made of their distributions of *IQ*'s and of paternal occupations classified according to the Minnesota Scale for Occupational Classification (18). The *IQ* distributions for the retest and standardization 4- and 5-year groups approximated one another. The means and standard deviations for the two groups were respectively: 105 ± 14 and 104 ± 14 . The *IQ* distributions for the 2- and 3-year groups showed a selection in the direction of superiority for the retest group. The means and standard deviations were 107 ± 18 for the standardization group and 116 ± 17 for the retest group. This selection with respect to *IQ*'s was a result of the elimination of the younger children who had failed more than one item at the lowest age level on both forms of the initial examination. The paternal occupational

distributions for the two groups at both the 2- and 3-year level and 4- and 5-year level were closely similar.⁵

Form *L* of the Revised Stanford-Binet Scale was administered to the retest group of 138 subjects without knowledge of the previously obtained results. To insure accuracy of scoring, every instance of doubtful scoring was submitted to Dr. Maud Merrill for final decision.

2. *Selection of Subjects for Further Study*

A detailed discussion of the comparison between initial and retest *IQ*'s has been presented elsewhere (7). It is sufficient to state here that the results indicated that the Revised Stanford-Binet Scale is as good as or better than any other test in predicting future intellectual status. The next step of importance in this study was the selection of subjects who had shown significant changes in *IQ* so that the environments of those who had shown increases and decreases could be compared. For this purpose the composite of Form *L* and Form *M* *IQ*'s was used as the initial *IQ*. Before computing the differences between initial and retest *IQ*'s two corrections were applied to the initial *IQ*'s. The first correction was to allow for regression of the retest *IQ* due to errors of measurement, and the second correction was made in order to equate the initial and retest *IQ*'s in relation to the means of their distributions. Because of the high reliability of the composite *IQ*, the corrections for regression were insignificant.⁶ There was no correction required for *IQ*'s which deviated from the mean by less than 17 points. For 34 *IQ*'s deviating by 17 to 51 points the correction was 1 point. No *IQ*'s deviated by more than 51 points.

For the purpose of making the second correction, means for initial and retest *IQ*'s for each of the six age groups were computed. Because of the similarities of their means, groups initially aged 2 and 2½ years were combined, groups aged 3 and 3½ years were combined, and the four upper age groups were combined. The mean *IQ*'s of the resulting combined groups and the differences between these means were calculated. The appropriate difference was then added to or subtracted from each initial *IQ*. This resulted in a decrease of the initial *IQ*'s for year groups 2 and 2½ of 7.5 points, an increase for year groups 3 and 3½ of 4 points, and an increase for

⁵Tables presenting these distributions appeared in a previous article (7).

⁶The following formula was used for the regression correction:

$$IQ_o = M + [\sqrt{r_{1r}}(IQ_o - M)]$$

in which IQ_o is the corrected *IQ*, IQ_o is the obtained *IQ*, r_{1r} is the reliability coefficient for the age level concerned, and M is the mean of the distribution from which IQ_o is drawn.

year groups 4, 4½, 5, and 5½ of 3 points. By making this second correction the comparability between *IQ*'s at the initial and retest ages was assured. Moreover, the resulting percentages showing increases and decreases in *IQ* were made to be approximately equal. If instead of making this correction a certain percentage of subjects of each group showing the most significant increases and the same percentage showing the most significant decreases had been selected, approximately the same subjects would have been included in the final study group.

In order to determine the significance of the difference between initial and retest *IQ*'s, the difference between the corrected initial *IQ* and retest *IQ* for each subject was related to the standard error of that difference. The standard errors of the *IQ*'s, from which the standard errors of the differences were computed, were based on reliability data obtained during the standardization of the revised scale (27, pp. 55 to 70). The standard errors of the initial composite *IQ*'s were obtained from the formula:

$$SE = \sigma_x \sqrt{1 - \frac{2r_{11}}{1 + r_{11}}}$$

in which σ_x is the standard deviation of the distribution, and r_{11} is the reliability correlation between the two forms of the scale. For the retest *IQ*'s, which were based on one form only, the smoothed standard errors found in the standardization of the scale were used directly.

Table 1 shows the frequency distributions for the critical ratios in terms of numbers and in terms of per cents for the 2- and 3-year group (2, 2½, 3, and 3½) and for the 4- and 5-year group (4, 4½, 5, and 5½).

TABLE 1
DISTRIBUTIONS OF CRITICAL RATIOS FOR *IQ* CHANGES FOR TWO AGE GROUPS

Critical ratio	Age 2 and 3		Age 4 and 5	
	<i>N</i>	%	<i>N</i>	%
3.6 plus	2	4	6	7
2.7 to 3.5	3	6	4	5
1.8 to 2.6	6	12	5	6
.9 to 1.7	7	13	11	13
.01 to .8	8	15	12	14
0	1	2	4	5
— .01 to — .8	9	17	15	17
— .9 to — 1.7	8	15	9	10
— 1.8 to — 2.6	1	2	10	12
— 2.7 to — 3.5	3	6	8	9
— 3.6 and below	4	8	2	2
Total	52	100	86	100

It had been originally planned to treat the two age groups separately since it had been anticipated that the changes for the younger group would be greater in both size and number. Since the correlations between initial and retest *IQ*'s were almost identical (.66 and .67 respectively) and since the percentages for extreme critical ratios were similar, as indicated in Table 1, it was decided that it was defensible to combine the two groups for the remainder of the study.

There was a question as to what critical ratio value to use as a criterion for the selection of cases to be included in the "*IQ*-change group." To have selected only those cases for whom the critical ratios were 3.0 or higher, and thus practically insure that all of the changes were true changes and not the result of errors of measurement, would have restricted the number of cases to 12 in the increase group and 10 in the decrease group. The inclusion of subjects with low critical ratios would have meant the greater possibility of including cases whose *IQ* changes were due only to errors of measurement. A compromise was made, and 1.8 was chosen as the lower limit of the critical ratio of a subject to be included in the *IQ*-change group. A critical ratio of 1.8 indicates that the observed difference or a larger one would not arise through errors of measurement alone more than seven times in one hundred. The number of subjects having critical ratios of 1.8 or higher was 54. These 54 cases comprised the *IQ*-change group to receive further study. The composition of this group was as follows: 26 showed an increase in *IQ*, of whom 11 were in the younger age group and 15 in the older group; 28 showed a decrease in *IQ*, of whom 8 were in the younger group, and 20 in the older group. About 40 per cent of each of the two age groups were included.

3. Interviews

The next problem was to compare the environments of the subjects whose *IQ*'s had increased with those of the subjects whose *IQ*'s had decreased. In order to secure information concerning the environments of the 54 children in the *IQ*-change group, it was proposed to interview the mother of each child, or father in case of death of the mother, and then to interview each child, without knowledge as to whether the child's *IQ* had shown an increase or decrease. This latter condition was thought to be exceedingly important because of the need to avoid the pitfalls of wishful thinking and unconscious prejudice. Throughout the first part of this study and until all of the information had been secured and quantified, the investigator kept in ignorance concerning the identity of the cases who had increased or decreased in *IQ*.

To facilitate conducting the interview and insure securing comparable

data for all subjects, interview questionnaires were prepared.⁷ The items were formulated after a consideration of several questionnaires and scales previously used in genetic and environmental studies (6, 9, 10, 11, 12, 13, 14, 15, 21, 22, 25, 29, 30, 33, 35, 36). The questionnaires for interviewing the mother included among its questions all of the items from the Minnesota Home Status Index (25), so that it was later possible to assign Home Status Index scores. In addition to being interviewed, the mothers were given a multiple choice vocabulary test composed of the last 35 words of the revised Stanford-Binet vocabulary list. Each child was given the Woodworth-Cady Questionnaire (30) to fill out, and was also given the same vocabulary test that was given to the mothers. This latter test was administered to the children to permit later validation of the test against Binet *MA*'s.

First contacts were made with the mothers through a personal call. At that time the nature of the study was explained and an interview which would take from two to three hours was requested. None of the mothers refused to make an appointment, but two found excuses to break up the interview before it was completed and refused to grant a second interview. These two cases were dropped from the study. In four cases the mother was dead, so the father was asked for an appointment. Three of them readily agreed; the fourth refused and the case was dropped. A fourth case was eliminated because her Japanese parents had so much difficulty speaking English. With the loss of four cases the number of subjects was decreased to 50.

After each 10 interviews the mothers were ranked as to intelligence and interest in child, and the homes were ranked for standard of living and general adjustment and happiness. The 50 children for whom complete parental interviews had been obtained were later interviewed in school. This interview took about one hour. After the total group had been interviewed and before the Woodworth-Cady Questionnaires were scored, the children were ranked for general adjustment.

4. *Quantification of Data*

In order to quantify the data from the interviews so that they could be subjected to statistical treatment, the subjects were ranked from 1 to 50 for the following 13 factors: intelligence of mother (ranks of 1 to 47 because three mothers deceased); intelligence of father; social maturity of mother; social maturity of father; stimulating reading material in the home;

⁷These questionnaires are included in the appendix of the bound thesis at the Stanford University library.

excursions, travel, visits to museums, and camp attendance; lessons in music, dancing, and drama; extent of recreational activity with parents; parents' interest in and knowledge of child training; play equipment and pets; socialization of the home; happiness of the home; general adjustment of the child. The ranking of the subjects in regard to each of these factors was based on information obtained during the interviews. The 13 sets of ranks were transmuted into units of amount or "scores" according to Hull's table of transmutation (16, p. 113). These new scores ranged from 0 to 89 and had the advantage over the raw ranks of following a normal distribution curve and therefore of being susceptible to treatment by the statistical methods commonly used for normally distributed variables.

The ranks of mother's intelligence were assigned without reference to their scores on the vocabulary test. A subsequently computed correlation between ranks of mother's intelligence (converted to units of amount) and vocabulary scores was found to be $.87 \pm .02$. The close agreement between these two indices arrived at by two quite different approaches suggests that they were both fairly valid as indicators of mother's intelligence. As a further check on the validity of the vocabulary test, the correlation between vocabulary test scores and Stanford-Binet *MA*'s for 52 subjects was computed. It was $.82 \pm .03$.⁸

Some additional quantified data were available for comparison. These data consisted of the following: the six subscores (expressed in terms of standard deviation units) of the Minnesota Home Status Index—cultural status, children's facilities, sociality, occupational status, economic status, educational status; the median of the six Minnesota Index scores; paternal grandfather's occupational classification according to the Minnesota Scale of Occupational Intelligence (8); maternal grandfather's occupational classification according to the same scale; average of the two grandparents' occupational classifications; mother's vocabulary score; and child's Woodworth-Cady score.

On the basis of the quantified data indicated above and a review of the complete questionnaire for each child, the investigator ranked the 50 subjects according to the stimulating character of the total environment of each. The criterion for assigning the ranks was the degree to which each environment seemed to have been conducive to normal or accelerated intellectual growth. These ranks were not arrived at by any quantitative procedures, but were based wholly on a clinical evaluation of all of the available data. As clinical estimates they are subject to the criticism frequently raised against

⁸Further research with the vocabulary test is in progress.

subjective data—that is, that they are less reliable than are objective data in the sense that they are less consistent with repetition. On the other hand, they have the value of similar clinical evaluations in that they are based on a consideration of all of the data and the inter-relationships of the data in a way which as yet is virtually impossible by statistical procedures.

In order to check the investigator's final ranking of environment, the cases were submitted in sub-groups of 10 cases each to outside judges for ranking. Each of 10 psychologists who had had considerable clinical experience was requested to rank the 10 cases in a sub-group.⁹ Since each of the 10 judges ranked one each of the five sub-groups, two sets of ranks, in addition to those of the investigator, were secured for each sub-group of 10 cases.

After breaking the investigator's ranks from 1 to 50 down into sub-ranks of 1 to 10 for each set of 10 cases, a comparison was made of the three sets of ranks for each sub-group. Product-moment correlations inferred from rank correlations (16, p. 194) between the ranks of each judge with those of the other two judges are indicated in Table 2. The mean of the 15 raw

TABLE 2
INTERCORRELATIONS* BETWEEN ENVIRONMENT RANKS OF INVESTIGATOR (I) AND TWO OTHER JUDGES (A AND B)

Groups	1 vs. A <i>r</i>	I vs. B <i>r</i>	A vs. B <i>r</i>	Mean of 3 <i>r</i> 's	Corrected mean <i>r</i> **
1	.945	1.000	.945	.963	.987
2	.978	.956	.956	.963	.987
3	.877	.899	.888	.888	.962
4	.978	.911	.922	.937	.978
5	.877	.911	.877	.888	.962
Mean				.928	.975

*Rank correlations converted to *r*'s.

**Corrected by Brown-Spearman prophecy formula.

intercorrelations was .93. This table also shows the means of the three correlations for each set of cases corrected by the Brown-Spearman prophecy formula (16, p. 269). As indicated in the table the mean of the five corrected means was .975.

Since there was a distinct advantage in having one set of ranks from 1 to 50 rather than five sets of ranks from 1 to 10 not related to one another, and since there was such close agreement between the investigator's sub-ranks

⁹The writer is indebted to the following for acting as judges: Miss Marion M. Astley, Dr. Elinor J. Barnes, Dr. Nancy Bayley, Miss Myra W. Kuenzel, Dr. G. Ann Margaret, Dr. Maud A. Merrill, Miss Helen Marshall, Miss Melita H. Oden, Dr. Ruth T. Storey, and Dr. Clare Wright.

and the ranks of the outside judges, the investigator's original ranks from 1 to 50 were used as the ranks of environment. As was done with the ranks of individual factors, these ranks were transmuted into units of amount ranging from 0 to 89 and became the final indices of environmental stimulation.

D. RESULTS

1. *Comparison of Increase and Decrease Groups*

It was only after the evaluation of the individual environments had been completed that the investigator became informed as to which subjects had increased and which had decreased in *IQ*. On the basis of this information the subjects were classified into two groups according to the direction of *IQ* change. The *IQ*-increase group contained 24 subjects; the *IQ*-decrease group contained 26 subjects. The mean chronological ages of the two groups at the time of both examinations were almost identical: 3.8 ± 1.1 and 4.2 ± 1.0 at the preschool level, and 13.3 ± 1.5 and 13.8 ± 1.5 at the re-examination.¹⁰ The mean *IQ* of the increase group had increased from 107 ± 13 to 126 ± 13 ; the mean *IQ* of the decrease group had decreased from 113 ± 18 to 96 ± 18 . At the preschool level the mean *IQ*'s of the two groups were within six points of one another. Ten years later the difference between their mean *IQ*'s was 30 points. Comparison of the two groups as regards the variables ranked and scored was made in order to determine what factors might have been operating to have caused a rise in the one group and a fall in the other.

Comparison of the two groups was made by the method of computing the differences between the means for the two groups and relating them to the standard errors of these differences to obtain critical ratios. These statistics are presented in Table 3. It will be noted that all of the differences for ranks, Minnesota indices, and test scores were positive—the increase mean was above the decrease mean—except for the two indices of child adjustment, rank of adjustment and Woodworth-Cady score, both of which were low negative. Only the critical ratio for mother's vocabulary, however, indicated a statistically significant difference according to the criterion of significance demanding a critical ratio of 3.00 or higher. The critical ratio of 2.95 for rank of mother's intelligence closely approached statistical significance. It will be recalled that the rank of mother's intelligence correlated with mother's vocabulary score to the extent of .87. The critical ratio of 2.07 for rank of father's intelligence indicates that the observed difference

¹⁰All measures of variability reported are standard deviations.

TABLE 3
COMPARISON OF INCREASE AND DECREASE GROUPS FOR RANKED AND SCORED FACTORS

"Scores" transmuted from ranks	Increase		Decrease		Diff	Diff. $\sigma_{diff.}$
	Mean	σ_m	Mean	σ_m		
Adjustment of child	49.33	4.22	50.15	3.52	— .82	— .15
Happiness of home	49.67	3.69	49.54	3.84	.13	.02
Socialization of home	50.96	4.20	48.93	3.72	2.03	.36
Social maturity of father	51.67	3.61	48.31	4.06	3.36	.62
Social maturity of mother	52.00	4.00	48.00	3.67	4.00	.74
Knowledge of child training	51.67	4.44	47.69	3.14	3.98	.73
Play equipment and pets	51.67	3.99	47.69	3.58	3.98	.74
Stimulating reading material	52.67	3.62	47.08	3.94	5.59	1.04
Recreations with parents	53.67	3.89	46.16	3.66	7.51	1.41
Lessons in music, dancing, etc.	55.33	3.57	44.31	3.75	11.02	2.13
Excursions, travel, etc.	57.00	3.36	43.18	3.75	13.82	2.75
Intelligence of father	55.33	3.27	44.62	4.02	10.71	2.07
Intelligence of mother*	57.71	2.95	42.77	4.14	14.94	2.95
Total environment	54.00	3.87	45.85	3.66	8.15	1.53
<i>Minnesota Home Status Indices</i>						
Economic status	.14	.15	.07	.18	.07	.31
Sociality	— .19	.15	— .33	.11	.14	.75
Educational (Parent)	.25	.18	— .10	.19	.35	1.31
Cultural	.39	.18	— .03	.22	.41**	1.46
Child's facilities	1.08	.19	.67	.18	.41	1.57
Occupational	.40	.16	— .03	.16	.43	1.94
Total median score	.38	.14	.05	.15	.33	1.57
<i>Test Scores</i>						
Woodworth-Cady Questionnaire	.40	.13	.60	.18	— .20	— .92
Mother's vocabulary*	20.43	1.21	14.15	1.53	6.28	3.22
<i>Supplementary</i>						
Mid-parent intelligence*	57.50	2.61	43.27	3.88	14.23	3.04
Mid-grandfather occupation	3.56	.19	4.17	.15	.61	2.53
Ancestral intelligence index*	57.26	2.42	44.23	3.09	13.03	3.32

*Three cases where mother deceased not included.

**If other statistics carried to three decimal places.

or a larger one would not arise through errors of sampling alone more than four times in one hundred. These results for intelligence of parents may be compared with the critical ratios for the all-over indices of environment—that is, the rank of total environment and the median of the Minnesota Home Status Indices. Both of these critical ratios were less than 2.00—the critical ratio for rank of total environment¹¹ being 1.53 and the critical ratio for the Minnesota median index being 1.57. Furthermore, none of the critical ratios for the individual Minnesota indices was over 2.00, and

¹¹This critical ratio was computed from the series of 50 ranks assigned by the investigator. The average of two critical ratios obtained from χ^2 's based on two splits of the average of the ranks from 1 to 10 of the three judges was 1.87.

only two of those for the 11 separate ranks other than mother's and father's intelligence was greater than 2.00. These two were the critical ratios for "excursions, travel, camp" and "music and dancing lessons" which were 2.75 and 2.13 respectively. Although these latter two critical ratios do not meet the criterion of statistical significance used in this study, their individual magnitudes indicate a high probability that they represent true differences and suggest the value of considering the two factors further in future studies.

The results so far suggested that factors which were more closely related to inheritable intelligence were also more closely related to direction of change in *IQ*. To test this hypothesis further the averages of mother's and father's intelligence scores (transmuted from ranks) were calculated, and the critical ratio for the difference between the means of mid-parent intelligence of the increase and decrease groups was computed. This critical ratio was found to be 3.04, which satisfied the accepted criterion of statistical significance. As an additional step the Minnesota occupational intelligence of the grandfathers was studied. The average of the occupational classifications of the two grandfathers of each child was calculated. It would have been desirable to have had a more accurate index of grandparent intelligence, but this rough index was the only one available. The critical ratio for the difference between the means of the mid-grandfather occupational intelligence for the increase and decrease groups was 2.53. This did not fully reach the accepted level for statistical significance, but there was only one critical ratio, other than those for parental intelligence, which exceeded it.

Finally an index was computed which gave weight to both parental intelligence and grandfather's occupational intelligence. To secure this index the mid-grandfather occupational classification was converted to a proper corresponding score on a scale having the same mean and standard deviation as mid-parent intelligence. Then the sum of the converted mid-grandfather occupation "score" and twice the mid-parent intelligence "score" was divided by three to secure an index which will be referred to as the "ancestral intelligence index." By this method mid-parent intelligence was weighted by two and grandfather intelligence was weighted by one. The critical ratio for the difference between the mean ancestral intelligence indices for the increase and decrease groups was found to be 3.32, which was higher than any other critical ratio found, and which fully satisfied the accepted criterion of statistical significance.

2. *Comparison with Results of Previous Studies*

The results of the analysis of the factors related to *IQ* changes made in the present study cannot be compared directly with those of previous studies since both the method of procedure and the type of statistical treatment do not correspond to those previously used. Some of the implications, however, may be pointed out and compared with conclusions made in earlier studies.

The results of the present study agree with formerly obtained ones in suggesting that *IQ* changes are not wholly unpredictable. Individual comparisons show that the results of this study agree with Bayley's findings that paternal occupation is more closely related to *IQ* change than is social rating—if the Minnesota Index of sociality or the rank of "home socialization" used in the present study can be considered comparable to Bayley's social rating.

Bayley, Honzik, and Anderson all indicated that parents' education was an important factor in relation to *IQ* changes. The findings of the present study suggested that, although more important than sociality, it was less important than other variables. Comparison of the six Minnesota Home Status Indices showed that *IQ* changes were less closely related to parental education than they were to occupational status, child's facilities, and cultural status.

The results of the present investigation are more in line with the findings of Honzik than with those of Bayley in regard to the age at which the relation between home variables and rate of mental growth ceases to increase. Bayley found that the relation between *IQ* and all but one of the factors which she studied ceased to increase at some age between two and five years, which is the age level at which most of the subjects in the present study were initially examined. Honzik, on the other hand, found that the relation between several home variables and *IQ* continued to increase beyond the age of six years, which was also indicated in the present study since the differences in favor of the group who had increased in *IQ* over the group who had decreased in *IQ* occurred subsequent to an initial age of two to six years. The small number of cases in the present study did not permit an intercomparison of age groups, but a cursory examination of the data failed to reveal differences between the younger and older groups as to the relative importance of the factors considered.

E. DISCUSSION

The present investigation was undertaken in order to discover factors

which might be related to significant changes in *IQ*. Since the subjects were children who had been selected as representative of the general population, the implications of the results are general and not limited to a select group. In order to avoid registering *IQ* changes due to artifacts of the test, a single test of demonstrated reliability and validity was used for both initial and retest examinations with a long enough interval between the two examinations to preclude practice effects. Allowance was made for regression due to errors of measurement by applying an appropriate correction to the initial *IQ*'s. Only those subjects whose *IQ* changes approached statistical significance were included in the experimental change groups. The influence of prejudice and pre-conceived ideas on the part of the investigator was avoided by the evaluation of all factors without knowledge of whether a given environment had been associated with a gain or loss in *IQ*.

The results of this study are consistent with conclusions of previous investigators that *IQ* changes are related to environmental or home variables. All of the factors ranked or measured, except adjustment of child, were related to significant *IQ* changes in favor of the increase group over the decrease group. However, not all of the factors were sufficiently related to produce statistically significant differences between means of the increase and decrease groups. In fact the majority of the differences were not statistically significant. Critical ratios between 2.00 and 3.00 were found for "music and dancing lessons," "excursions, travel, camp," father's intelligence, mother's intelligence (rank), and mid-grandfather occupational intelligence. Critical ratios of 3.00 or higher were found for mother's vocabulary score, mid-parent intelligence, and an ancestral intelligence index which combined parent and grandparent intelligence. The highest critical ratio, 3.32, was found for the ancestral intelligence index, whereas the critical ratios for the two all-over indices of environment were 1.53 and 1.57.

Many psychologists and educators have been concerned with the problem of whether level of intelligence was determined to a greater extent by hereditary factors or environmental factors. The present study was not designed to supply convincing evidence on this problem. Since the subjects associated with their own parents, the effects of heredity and environment could not be separated. The relation between *IQ* changes and any, or all, of the factors considered could have been due theoretically to either the sole influence of environment or the sole influence of heredity. The greater participation in excursions, travel, and camp of the increase group, for example, may have stimulated their mental growth and resulted in *IQ* increases, or this greater participation may have reflected a higher

intelligence of the parents of these children and a delayed realization on the part of the children of the relative level of their inherited intelligence.

Parental intelligence, itself, may function either as an environmental factor or as a genetic factor. The fact that the critical ratio for parental intelligence was considerably higher than the critical ratios for the two indices of total environment might seem to throw the balance in favor of heredity as being the more potent determinant. It is possible, however, that parental intelligence might have been a better all-round index of culture or environment than were the specified indices of environment. The fact that the grandfather occupational intelligence produced a higher critical ratio than did most of the other factors, except parental intelligence, is more difficult to reconcile with an extreme environmental theory. The majority of the subjects associated with their grandparents to only a slight degree. It is possible to contend, however, that intelligence of grandparents is indirectly related to the child's environment by the direct relation, either genetically or culturally, to parental intelligence and the function of parental intelligence as a factor in the child's environment.

Regardless of whether it be concluded that significant *IQ* changes occurring in a group of unselected children are more closely related to variations in heredity or to variations in environment or are related to both equally, no conclusions can be drawn from material of this kind as to the possible effects of extreme deviations of heredity and environment. The present study was concerned with determining what factors are related to given *IQ* changes, rather than with determining what *IQ*'s result from a given environment or a given heredity.

A problem which confronts the practicing clinical psychologist is that of improving the prognosis of ultimate intellectual development of young children. The correlations in the high .60's found between *IQ*'s obtained at the preschool level and those at the junior high school level (7) indicate that the revised Stanford-Binet *IQ*'s of preschool children have good predictive value for groups, but are of only fair value for individual prognosis. So far, moreover, there is apparently no other intelligence scale for this early age level which has any better, if as good, predictive value. Consequently it is well to look for aids to supplement the Stanford-Binet in predicting ultimate intelligence. It has already been suggested by Hallowell (20) and Gesell (17) that a clinical appraisal of a young child's total behavior has more predictive value than the isolated results of an objective intelligence examination. The discovery of related factors which may be objectively measured, however, would presumably simplify prognosis and

permit a more accurate prediction when the services of an experienced clinician are not available.

The findings of the present study suggest that consideration of ancestral intelligence in addition to the preschool child's *IQ* may materially improve the prediction of ultimate intellectual development. Since the majority of children live with their own parents, the question of whether ancestral intelligence operates as a cultural factor or as a genetic factor in affecting the *IQ* has little bearing on its general use in prognosing the course of mental development. It has been demonstrated that significant changes in *IQ* are related to an ancestral intelligence index based on the intelligence of parents and grandfathers, and it may be plausibly assumed from this demonstration that the *IQ*'s of the majority of children who deviate significantly from the intelligence level of their parents and grandparents will ultimately change in the direction of this level. This last point, however, has not been proved. The proof of it will require an investigation in which the intelligence of parents and grandparents of all children in a group which have been reexamined is considered. It will then be necessary to determine whether there is a significant positive correlation between initial deviation from ancestral intelligence and the difference between initial and retest *IQ*'s. The final step will be to determine statistically the correct weight to place on ancestral intelligence as compared with a child's own *IQ* in order to make the most accurate prognosis possible of a preschool child's ultimate level of intelligence.

F. SUMMARY

1. One hundred and thirty-eight children representative of the general population who had been examined with the Revised Stanford-Binet Scale between the ages of 2 and $5\frac{1}{2}$ years were located 10 years later and re-examined with the same scale.

2. The environments of the 54 subjects for whom the critical ratios for the difference between initial *IQ* (corrected) and retest *IQ* were 1.8 or higher were studied by the method of home interviews.

3. The 50 subjects for whom complete home interviews were obtained were ranked for 13 environmental factors, scored on the Minnesota Home Status Index, and classified for maternal and paternal grandfathers' occupations. Finally the subjects were ranked for the stimulating character of their total environments.

4. The final environmental ranks made by the investigator were checked by submitting the 50 cases in groups of 10 each to 10 outside judges so that

three sets of ranks for each sub-group of 10 cases were available for comparison. The Pearson product-moment correlations inferred from rank correlations between the ranks of each judge with those of the other two judges for each group of 10 cases ranged between .88 and 1.00 with a mean of .93. The five corrected mean r 's for the five sets ranged between .96 and .99 with a mean of .98.

5. Analysis of the data was made by comparing the 24 subjects who had increased in IQ with the 26 subjects who had decreased in IQ with respect to the quantified data available.

6. Critical ratios for the differences between the increase and decrease groups for the ranked factors, the Minnesota Indices, mother's vocabulary score, and mid-grandparent occupational intelligence showed that all of these factors except the subject's adjustment were related positively to IQ changes. Most of the critical ratios were less than 2.00. Critical ratios between 2.00 and 3.00 were found for rank of "music and dancing lessons," rank of "excursions, travel, camp," rank of father's intelligence, rank of mother's intelligence, and mid-grandfather occupational intelligence. Critical ratios of 3.00 or higher were found for mother's vocabulary score, mid-parent intelligence, and an ancestral intelligence index based on mid-parent intelligence and mid-grandfather occupational intelligence. The highest critical ratio, 3.32, was found for the ancestral intelligence index which may be contrasted with critical ratios of 1.53 and 1.57 for the two all-over indices of environment, namely, the rank of total environment and the median Minnesota Home Status Index.

7. It was concluded that significant changes in IQ from preschool to junior high school are related to factors in the environment. Whether the factors considered in this study operated primarily as environmental stimuli or whether they were for the most part merely related to inheritable intelligence which had not been fully realized at the time of the initial examination was not evident from the data.

8. Regardless of the controversy about the relative potency of heredity and environment, the study indicated the value of considering ancestral intelligence in addition to a preschool child's IQ when prognosing ultimate intellectual development.

9. The study showed that where significant changes in IQ had occurred, it was likely that initial deviations from ancestral intelligence had existed. The value of a corollary study was indicated in which the answer to the other side of the question would be sought—if initial deviations from ancestral intelligence exist, do changes in IQ generally follow?

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SHORT ARTICLES AND NOTES

The Journal of Genetic Psychology, 1945, **66**, 129-137.

THE GROWTH AND DECLINE OF A CHILDREN'S SLANG VOCABULARY AT MOOSEHEART, A SELF-CONTAINED COMMUNITY*

Mooseheart Laboratory for Child Research

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The object of this investigation was to discover the permanency of a slang vocabulary among the children at Mooseheart over a period of 11 years as a follow-up of a study of slang within the community by Leonard W. Merryweather (1) in 1930 and 1931. Slang may be defined for the purpose of this study as old words with unauthorized meanings and new words created to fill a gap in the children's vocabularies.

Mooseheart is a self-contained community which covers 1200 acres on the Fox River 40 miles west of Chicago and is owned and operated by The Loyal Order of Moose for the physically and mentally normal orphans and widows of the members of that fraternity. The children come from all states of the Union and Canada. The aim of Mooseheart is to approximate ideal living conditions on the outside. This is brought about by the "cottage plan" whereby groups averaging 15 children of the same sex and approximately the same age and grade placement in school live together in a cottage. There are 30 of these cottages, and each is a complete home unit in itself: parlor, dining room, kitchen, bed rooms, and bathroom. There are no dormitories or central dining halls at Mooseheart. Each cottage is staffed by a housemother and a cook. The halls for the younger children have as many as three housemothers. In the cottages for the older boys a married couple serves as houseparents. All of the children are obliged to fulfill routine household duties in their cottages. The "cottage plan" permits a way of living in the manner of a large, normal family rather than following the pattern of institutionalized living. There is a recreational program that includes both intermural and intramural athletics, musical organizations, movies, parties, and dances.

There are at Mooseheart, besides the residential halls, a completely

*Received in the Editorial Office on April 10, 1943.

¹The author wishes to express his sincere appreciation to Martin L. Reymert, director of The Mooseheart Laboratory for Child Research, for his assistance in the preparation of this manuscript; for his interest and perseverance in behalf of the study of language habits at Mooseheart.

equipped and well-staffed hospital and dental clinic; a school system which embraces everything from the nursery and kindergarten through elementary, vocational, and high school, each complete with staff and buildings; a grocery store which supplies the community with its food; two department stores, one for the boys and one for the girls, which furnish a wide variety in the choice of clothes worn by the children; a large central heating plant; a student bank run along the lines of a regular commercial bank; a modern dairy farm and bottling plant which supplies the community with its milk and cream; a garage and gasoline station for the maintenance of the farm trucks and machinery; a carpenter shop; a greenhouse; a fire department; a cannery; and a laundry. In short, Mooseheart's physical environment is as complete, varied, and representative as that of any other community of its size in the country.

Merryweather was able to designate 135 words that were used by the 691 Mooseheart boys and 587 Mooseheart girls who ranged in ages between one and 19 years. He offered the following suggestions as to possible origins of the slang words included in his study:

- "(1) those brought by the older entrants to Mooseheart from their homes: *bull, bull-fest, bunk, dame, goof, loon, Scotch*;
- "(2) newspapers and movies: *scram, stooley, drag*;
- "(3) common words given new meanings by Mooseheart children: *cattle, dirty, nifty, giggle, squirrel*;
- "(4) form or meaning (or both) used exclusively on Mooseheart campus: *lorg, to aggie, caspar, smutch, squawkie*."

Merryweather states: "Since the slang . . . was originated . . . almost entirely by the children themselves, the vocabulary naturally reflects the interests of children . . . their habits . . . the attachments of nouns and adjectives of opprobrium on the least provocation, and the merciless ridicule of that which failed to meet their approval." Most of the 135 words in his study were related to the youngsters' "opinions and evaluations of mental unsoundness or eccentricity, stupidity, disciplinary officers, and attempts to elude them."

In the present study questionnaires were sent to 100 staff members, teachers, housemothers, cooks (in short, all who were dealing with children in their daily life), explaining briefly the nature of the study and asking that they contribute their observations of the slang used by the children and give practical examples of the slang words in *sentence form*. A special request was made that they do not mention the study to or around the children, since it was felt that any awareness of such a study on the part of the chil-

dren would inhibit their free and spontaneous use of the very words which were being sought. The questionnaire was accompanied by a list of words of the now 11-year-old study of Merryweather. These questionnaires were left with the staff members for about a month.

A total of 78 slang words was found in the present study. Sixty of these 78 words may be classified as new words; i. e., they were not to be found in the previous study. Twenty-three of the 60 words might be designated as general slang words nationally. Eighteen words (or about 23 per cent) of the total of 78 were included in the earlier study, and 10 (or 13 per cent) of these are now in general usage everywhere, leaving eight specific local slang words (or 10 per cent of the present study and 6 per cent of the former study) that have maintained themselves and survived the 11-year period.

A list of the words collected in the present study follows in Table 1.

TABLE 1
THE MOOSEHEART SLANG VOCABULARY OF 1942²

<i>aft'</i> (NU) (noun)	afternoon. "I'll do it this aft', si."
<i>After you on that</i> (N) (interjection of a complimentary nature)	"Hey, after you on that dress!"
<i>babes</i> (NU) (noun)	girls. "Look at those cute babes"
<i>blow</i> (NU) (verb)	to scold, nag, become angry. "Mr. . . . is always blowing at us."
<i>boring</i> (NU) (adjective)	undesirable, unpleasant, dull. "It's boring stuff."
<i>brainy</i> (NU) (adjective)	intellectual. "He's a brainy guy."
<i>brud</i> (NU) (noun)	brother. "Where's your brud?"
<i>bruck</i> (N) (noun)	tooth, used even when the deformity commonly known as "Buck-teeth" (overbite) is not present. "He's at the hospital getting his bucks fixed."
<i>bug</i> (F) (noun)	psychologist. "He's a bug over at the Laboratory."
<i>bughouse</i> (N) (noun)	The Mooseheart Laboratory for Child Research. "I've got a permit to go to the bughouse."
<i>bump</i> (N) (verb)	to die. "He bumped at the end of the book."
<i>catch</i> (N) (verb, usually followed by "to")	to understand. I don't catch to this, Miss . . . Oh, now I catch."
<i>choice</i> (N) (interjection)	used to mean no choice; the negative is understood but never stated. Staff member to a student: "Is this your choice of seats for the movie?" Student: "Choice!"
<i>collegiate</i> (F) (adjective)	satisfactory; delightful; admirable. "Oatmeal's a collegiate breakfast food!" "Gee, Miss . . . , you're collegiate for letting us off."
<i>connects</i> (N) (noun)	connections. "I don't get the connects."
<i>crew</i> (N) (noun)	a great many (individual persons or things); not to be confused with "gang," q. v.
<i>crook</i> (F) (verb)	steal. "He went in my locker and crooked my socks."

²(N) designates a new word: a word submitted in the present study that was not included in the previous study and is not heard outside of Mooseheart. (NU) designates a word submitted in the present study that is in universal usage. (F) indicates a word that was submitted in the present study and also appeared in the previous study. (FU) designates a word as one that also appeared in the previous study, was submitted in the present study, and is now in universal usage.

TABLE 1 (continued)

<i>cruel</i> (N)	(adjective) rough. "The kids played dirty cruel football."
<i>cute</i> (N)	(adjective) bowlegged. "Is he ever cute!"
<i>dag</i> (N)	(verb) to jab, injure. "I'll dag you."
<i>dame</i> (FU)	(noun) girl, woman. "She's a dizzy dame."
<i>dirty</i> (F)	(adverb) very. Dirty is the adverb of all work. "Boy, that was a dirty nifty show." "I returned that book a dirty long time ago. "Look, Miss, my hands are dirty clean."
<i>dizzy</i> (NU)	(adjective) foolish, silly. "She's a dizzy dame."
<i>do</i> (N)	(verb) to defeat. "I wish I could do him."
<i>don't got none</i> (N)	(verb phrase) to have none. "I don't got none."
<i>dope</i> (NU)	(noun) a person whose mental powers are not respected. "You dope!"
<i>dough</i> (NU)	(noun) money. "Can I get some dough from the bank, Miss?"
<i>drip</i> (NU)	(noun) the same as "dope."
<i>dumb</i> (FU)	(adjective) stupid uninteresting. (from the present study) "I don't want to hear that dumb stuff (referring to a radio program)."
<i>fan</i> (N)	(noun) a boy friend or a girl friend, but more than an admirer. "Miss, do you think . . . (plain Jane) will ever have a fan?"
<i>fang</i> (N)	(noun) tooth. "Shut up, or I'll knock your fangs out."
<i>first extra</i> (F)	(noun) first chance to extra helping of food. "I ate fast so I'd get first extra." From the present study (N) (interjection) "First extra on your salad!"
<i>flip</i> (N)	(noun) favor. "Do me a flip."
<i>gang</i> (N)	(noun) a lot, much, a great deal. "A dirty gang of fun." Crew: "A dirty crew of guys"
<i>go</i> (N)	(verb) to say. "He goes, 'Well, what did you do?' and I go, 'I didn't do nothing.'"
<i>gripe</i> (NU)	(verb) to complain; to rate disapproval. "We started griping about the rules." "It (most anything) gripes me."
<i>guy</i> (FU)	(noun) boy, girl, student, person. "You're too strict with the guys." One girl to others, "Come on, you guys." In the present study, it is noted that "guy" is used without regard to age or to sex.
<i>gyp</i> (FU)	(noun) an unfair transaction or decision. "He won't let me play. It's a gyp!"
<i>hag</i> (NU)	(noun) a lady very much disliked. "I wouldn't do it for that hag."
<i>hilk</i> (N)	(interjection) denotes embarrassment.
<i>hooky</i> (N)	(verb) to steal. "I didn't either hooky that."
<i>hunky-dory</i> (NU)	(adjective) satisfactory. "Everything is hunky-dory."
<i>Jesus</i> (NU)	(adjective) used reverently to pertain to anything of a religious or Biblical nature; as a "Jesus" picture or calendar.
<i>jigs</i> (N)	(interjection) leave. "Jigs, here he comes!" (very likely a contraction of jiggers, which has the same meaning and appeared in the previous study.)
<i>kick</i> (N)	(noun) favorable evaluation "We had a kick of a time."
<i>kick</i> (N)	(verb) to die. "Enoch Arden kicked (at the end of the story)."
<i>leech</i> (F)	(verb) to remain in or around the institution after one's graduation time; to borrow without intending to repay. "I can't leech any more paper." "Believe me, I'll never come leeching around here when I'm out."
<i>leech</i> (F)	(noun) one who remains at or received aid from the institution after his graduation year. Students in the fifth year of high school who finished the fourth year before they were seventeen are known among the others as "The Leeches."
<i>like</i> (N)	(adjective) a suffix of comparison. "Calm-like evening, "funny-like guy." "Real-like" means true.
<i>Miss</i> (N)	(noun) used for all women, married or single and without proper name following.
<i>mousey</i> (NU)	(adjective) contemptuously small. "That mousey thing!"

TABLE 1 (Continued)

<i>nifty</i> (FU) (adjective)	excellent, intelligent, satisfactory, skillful; a word in wide use to denote approval. "Play nifty (football)." "That's a dirty nifty . . ." is the ultimate phrase.
<i>putrid</i> (NU) (adjective)	undesirable, connotes disfavor. "History is putrid."
<i>rotten</i> (N) (adjective)	undesirable, disliked, "That radio program is rotten."
<i>rumba-punch</i> (N) (noun)	a sharp, sudden blow with the hip against the hip of another person (arising from a misunderstanding of the fundamentals of the rumba and from a confusion of it with the conga).
<i>sad</i> (NU) (adjective)	maudlin, sentimental, hesitant, ridiculous. Often used at Mooseheart scornfully in regard to the changing status of campus love affairs, whether of long duration or one that is just budding.
<i>shag</i> (FU) (verb)	to chase. "All the guys'll be shagging rabbits," In the present study: to hound, persecute. "She's always shagging me." (referring to his house-mother).
<i>silvers</i> (NU) (noun)	knives, forks, spoons. "Miss, should I put the silvers on the table now?"
<i>snags</i> (N) (noun)	tonsils. "He's in the hospital getting his snags jerked out."
<i>snazzy</i> (NU) (adjective)	splendid, "nifty." "Gee, you wear snazzy clothes, Miss."
<i>snitch</i> (FU) (verb)	to report a misdemeanor; to tattletale. "Aw, the janitor snitched on me."
<i>snook</i> (N) (verb)	crept "He snook thru the bushes."
<i>stack</i> (NU) (verb)	to attack with vicious intent. "Let's stack him!"
<i>storky</i> (N) (adjective)	tall, thin, scrawny, long-legged. "He sure is storky."
<i>straw</i> (N) (noun)	leg. Said of a boy who achieved fame on the track team: "It's those long straws of his!"
<i>tank</i> (NU) (noun)	stomach. "I feel better now my tank is full."
<i>tankache</i> (N) (noun)	stomachache. "Miss, can I go to the hospital? I've got a tankache."
<i>thing</i> (NU) (noun)	used to designate almost any person or object. Sometimes it is dignified by being prefaced by "Miss," but never by "Mr." "Miss Thing said . . ." "I had to go to see Thing about a permit." "I gotta write a thing (outline)"
<i>tweak</i> (N) (verb)	to throw. "He tweaked it in the lake."
<i>twerp</i> (NU) (noun)	a young child, or one regarded as such even though he is the same age as the speaker. "Aw, do I have to help that twerp?"
<i>wait up</i> (NU) (verb phrase)	wait for me. "Wait up, you!"
<i>wiggle</i> (N) (noun)	dance. "Can I have this wiggle?"
<i>wiggle</i> (N) (verb)	to dance. "They're out there wiggling."
<i>win him out</i> (N) (verb phrase)	to defeat him; to triumph over. "I'll win him out, you see."
<i>yell on</i> (F) (verb phrase)	to speak for next turn. "I yelled on that Tribune before you did."
<i>young</i> (FU) (adjective)	small. "Gee, but I got a young piece of pie."

In the cases of words that appeared on the former study, the definitions which accompanied them then are used here. Any changes in or enlargements upon those meanings have been noted.

Some avenues to slang creations are extensions of the original meanings, misunderstandings of the true meanings, a shortening of the acceptable form of a word, or simply bad grammar.

Examples of slang words created by extending the original meanings of words are *babes*, *buck*, *bug*, *bughouse*, *sad*, and *silvers*.

Examples of slang words derived from misunderstandings of the real meanings of words are *boring*, *bump*, *gang*, *gripe*, *hag*, *kick*, *putrid*, and *rumba-punch*.

Slang words that are built by shortening the acceptable form of a word are *aft'*, *brud*, *connecks*, and *jigs*.

Jesus, *crook*, *storky*, and *drip* are the results of making nouns or verbs serve as adjectives or nouns serve as verbs. *Snook*, *win him out*, *-like*, *wait up*, and *don't got none* are examples of slang developed from bad habits of grammatical usage.

Classifying the words in the original study of Merryweather and those from our own, the comparative results are given in Table 2. As will be

TABLE 2

Part of speech	MERRYWEATHER		KASSER		WILLIAM and MATTSON (2)	
	Number	Per cent	Number	Per cent	Per cent	
NOUN	85	63	32	41	30.18	(Total of nouns and noun substitutes)
VERB	21	16	18	23	27.93	
ADJECTIVE	14	10	18	23	10.31	
ADVERB	1	1	1	1	17.05	
INTERJECTION	8	6	5	6	2.37	
NOUN phrase	3	2	0	0	—	
VERB phrase	2	1	4	5	—	
ADVERB phrase	1	1	0	0	—	
Total	135		78			

seen, the rank order of these parts of speech are relatively the same in all lists.

While verbs appear more frequently among the slang vocabulary of adults, the preponderance of nouns among the slang vocabulary of children is in keeping with the development of language habits generally. It is often possible to connote feelings toward an object by the choice of a noun, and this is demonstrated many times in the list of nouns among the Mooseheart slang, particularly when the feelings are those of disapproval. Examples of such words are *bug*, *bughouse*, *dope*, and *drip*. The smaller number of verbs among a children's slang vocabulary might be explained by the fact that youngsters are not yet familiar enough with that form of speech to develop new words or to shorten words that they already know and use. That verb forms give trouble to children as often as to adults can be readily confirmed by English teachers. But since the child's experiences are fewer and his evaluations of actions less profound, it is easy to understand why creations of verbs for a slang vocabulary are limited. Another reason for this might

be that English teachers spend so much time drilling the children on verb forms that they concentrate on finding the correct verb form instead of building new ones.

Boys and girls alike use the slang. The younger children tend to ape the older children, and the building of new slang words in the Mooseheart community, therefore, rests primarily with the high school students. The slang words originate from the varied activities of the children and express their reactions to objects and happenings in the entire community environment. The derivation of these words is often elusive, but it is possible to visualize many routes over which certain generally accepted terms might have traveled to reach their present strained and often weird meanings.

In comparing the two studies, the difference between the number of children enrolled at Mooseheart at the times of the studies cannot alone be the explanation for the decrease in the number of slang words in the present study from that of the earlier collection. Since the average length of time a child stays at Mooseheart is ten years and two months, it would be expected that words in use at the time of Merryweather's study would appear in the present study. Some of the words included in Merryweather's study have been used so much, not only at Mooseheart, but everywhere, that their acceptability might appear unquestionable now: *any' old day*, *baloney*, *beak*, *beat it*, *beexer*, *bop*, *bozo*, *bull*, *bull-fest*, *bunk*, *can*, *day off*, *dibs*, *dippy*, *drag*, *flatten*, *gab*, *goof*, *goofy*, *junk*, *jane*, *jiggers*, *kluck*, *klucky*, *leave*, *loon*, *nab*, *nail*, *nut*, *nutty*, *raw*, *Scotch*, *scram*, *simp*, *smack*, *squawkie*, *straight*, *straight goods*, *suck*, *wallop*, *witch*, and *worm*.

Aquarium (Catholic chaplain's home), *fish*, and *fishheater* (both of the latter two are used to identify a Catholic) have disappeared during these 11 years. Very likely religious instruction and a broader tolerance for religions among the protestant children (who were the only ones to use these words) are responsible for striking these words from the Mooseheart slang vocabulary.

Nineteen words in Merryweather's collection related to the officials of the community, proctors, guards, the punishment farm, and attempted escapes. These words are included in this classification: *beanery*, *farm*, *fetch*, *flatfoot*, *night-caller*, *old lady*, *plug*, *Scorchy*, *screw*, *sluefoot*, *smutch*, *squeak*, *stick*, *Stooley*, *stump*, *tack*, *thunder*, *walking tree*, and *supreme being*. It is interesting to note here that not one of these 19 words appears in the present study.

Three words in the earlier study were derived from the names of staff members: *Lee Chuck* (a warning signal), *Scorchy* (a watchman's name and

another word of warning), and *Cooper* (a clumsy individual). None of these words has remained in the slang vocabulary, and their parallel among the present personnel has not yet appeared.

What of the words Merryweather listed as having received new meanings from Mooseheart children? Of the 10 examples he listed, two remain today. They are "dirty" and "nifty." "Nifty," meaning excellent or satisfactory, can be heard in general use outside the community of Mooseheart with the same meaning. "Dirty," (meaning "very") then, would appear to be the one outstanding word in the Mooseheart child's slang vocabulary over an 11 year period. The other eight words and their meanings follow:

"to aggie"	"to gossip"
"cattle"	"girls"
"caspar"	"a queer or stupid person"
"giggle"	"a church or assembly speaker from outside Mooseheart"
"lorg"	"stupid person"
"smutch"	"an escape effected by sneaking or slipping away unnoticed."
"squawkie"	"a talkie; a sound motion-picture"
"squirrel"	"a psychologist or psychiatrist" (derived from the common belief that The Mooseheart Laboratory for Child Research was examining the children to find the "nuts," queer or abnormal people in the Mooseheart vernacular).

None of the words typical of the slang of the jitterbug era are found in the Mooseheart slang, although the children have radios and attend movies. The Mooseheart children are likely saved from the exposure to juke boxes, coke bars, and Andy Hardy films. Consequently, "in the groove," "hep," and "icky" do not appear in the Mooseheart slang.

SUMMARY

1. A study has been undertaken with the view of determining the life and decay of local specific slang words during an 11 year period. The slang vocabulary was found to be reduced from 135 words to 78 words, or by 42 per cent.

Sixty (or 77%) of these 78 slang words did not appear in the earlier study.

Twenty-three (or 38%) of these latter 60 new slang words are used nationally.

Eighteen (or 23%) of the 78 slang words appeared in the earlier study; and 10 of these 18 words are used nationally, while eight have remained in the slang vocabulary over the 11 year period.

This group of 18 words is 13 percent of the total of 135 words collected in the first study. The group of 10 words that is in national usage is 7 percent of the total collected in the first study, and the eight words that have remained local specific slang words represent 6 per cent of the total of 135 words found in the first study.

2. In both studies it was found that nouns were the most numerous; verbs and adjectives follow second and third in numerical rank respectively. One adverb, "dirty," appeared on both studies and was the only adverb to appear in the slang vocabularies.

3. The creation of new local specific slang words under conditions here described seems to originate in the following ways: (a) extensions of the original meanings of acceptable words; (b) misunderstandings of the true meanings of acceptable words; (c) shortening of the acceptable forms of words; (d) bad habits of grammatical usage; (e) specific experiences slang words thus created are apt to live in a community as long as the original causes for their development still exist.

4. The majority of the slang words originate with high school children of the community and spread from them to the younger ones.

5. Because of the supervised activities at Mooseheart, no slang words of the "Jitterbug" era appear in the slang vocabulary of the Mooseheart children.

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THE IMPORTANCE OF COURSE OBJECTIVES IN PSYCHOLOGY AS JUDGED BY STUDENTS*

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In a previous study dealing with course objectives in Psychology, the author (1) found that student judgment indicated that stated goals had been "very well met" and that goals dealing with personality and with emotions had been most successfully met. The present study was designed to check on the original results, and also to obtain information concerning student judgment of the *importance* of a series of objectives drawn up for a first course in Psychology.

Upon completion of a one-semester course, a group of Stephens College freshman and sophomore women were asked to rate each of 15 objectives according to the following scheme:

- 1 means that the objective is of extremely great importance
- 2 means that the objective is of considerable importance
- 3 means that the objective is of moderate importance
- 4 means that the objective is of slight importance
- 5 means that the objective is of no importance

Table 1 shows the list of objectives, arranged in order of rated importance, the number rating each objective, and the average rating received by each objective.

The average for all objectives taken together is 1.4. This can be interpreted as an indication that according to student opinion the 15 objectives are of substantial importance.

Further analysis of the data was made by totalling all the ratings made in each category, and converting to percentages. Table 2 shows these results.

Table 2 indicates that somewhat less than two-thirds of the students considered the stated objectives to be of "extremely great" importance while somewhat less than one-third considered the objectives to be of "considerable" importance.

The present group of students were also asked to indicate the extent to which they thought the 15 objectives had been *attained* in the Psychology

*Received in the Editorial Office on April 21, 1943.

¹Grateful acknowledgment is made to Mrs. Mattie McCammon and Miss Ann Morey for their fine assistance in the presentation of this study.

TABLE 1
AVERAGE RATINGS ON IMPORTANCE OF 15 OBJECTIVES

Objectives	N	Average rating
A genuine effort toward self-improvement psychologically.	101	1.1
Valid self-understanding. This would involve discovery of genuine assets and liabilities; comprehension of the true basis of the attitudes of others; development of valid self-confidence and personal adjustment.	101	1.2
Emotional control. Progress toward the understanding of emotional causes and effects and toward the elimination of merely impulsive action.	101	1.2
Intelligent planning. This would include an objective analysis of abilities and interests; consideration of remote as well as immediate consequences of decisions; reliable estimates of the relative values of various courses of action.	101	1.3
Assumption of the responsibility for one's own actions, decisions and limitations.	99	1.3
Development of a sympathetic understanding of the faults and peculiarities of other people. An objective attempt to understand the real causes of the faults of others, and a considerate acceptance of such persons rather than prejudiced behavior toward them.	101	1.3
Formation of sound judgments. This includes a critical attitude toward rumor and gossip, an insistence on command of facts before forming an opinion, and restraint in forming strong likes and dislikes.	100	1.3
Recognition of your own prejudices and a genuine effort to minimize their undesirable effects.	100	1.3
Reaction to others on the basis of the whole personality rather than on the basis of a single prominent trait.	100	1.4
Reasonably good and reasonably rapid adaptation to changes in environment.	100	1.5
Friendly interest in people without imposing your own personality upon them.	99	1.5
Recognition of the prejudices of others, especially the ability to recognize and discount "stereotypes," and the ability to evaluate statements of others on the basis of their soundness rather than on the prestige of the person who makes the statement.	101	1.6
Differentiation between real explanation and mere description, and the ability to discriminate sound from faulty generalization.	97	1.6
A development of interest in psychological issues shown in pertinent contributions to discussion groups and in attendance at lectures or study groups.	101	1.8
A development of interest in psychological issues shown in reading and thinking beyond the required assignments. This would include news items and magazine articles which were appropriate, or it might include popular or technical books, or psychological novels.	100	1.9

TABLE 2
PERCENTAGES OF JUDGMENTS OF IMPORTANCE—ALL OBJECTIVES TOGETHER

Rating	1	2	3	4	5	Total
Percentage	61.4	30.3	7.9	.4	.0	100.0

course. In comparing these results with the results published in 1942, a rank-order correlation coefficient of .69 ($PE = .09$) was obtained. It thus appears that there is a fairly substantial agreement in judgment concerning the attainment of these objectives.

Examination of the rankings of the objectives by the two groups revealed some interesting changes. Two of the objectives received notably *higher* rankings in the second study. These were: (a) "Friendly interest in people without imposing your own personality upon them." The original rank of this objective was 12.5; the present rank is 6.5. (b) "A development of interest in psychological issues shown in pertinent contributions to discussion groups and in attendance at lectures or study groups." The original rank of this objective was 15; the present rank is 11.

Two of the objectives received notably *lower* rankings in the second study. These were: (a) "Recognition of your own prejudices and a genuine effort to minimize their undesirable effects." The original rank of this objective was 3.5; the present rank is 11. (b) "Recognition of the prejudices of others, especially the ability to recognize and discount "stereotypes," and the ability to evaluate statements of others on the basis of their soundness rather than on the prestige of the person who makes the statement." The original rank of this objective was 9; the present rank is 14.

The reasons for these four most pronounced changes in rank are unknown. There was no conscious effort on the part of the instructor to bring about any such changes. It is interesting to speculate, however, concerning the possibility that war conditions may have had something to do with the considerably lowered ranks for the two items dealing with prejudices!

The relationship between the judged importance of an objective and the degree to which the objective was achieved is indicated by the rank-order correlation coefficient of .55 ($PE = .12$). This moderate degree of relationship suggests that some of the more important objectives were not met as well as they might have been while less important objectives were relatively well met. Examination of the data show the following examples of such discrepancies:

The objective "Valid self-understanding." This would involve discovery of genuine assets and liabilities; comprehension of the true basis of the atti-

tudes of others; development of valid self-confidence and personal adjustment ranked 2.5 in importance and 11 in attainment. The objective "Reaction to others on the basis of the whole personality rather than on the basis of a single prominent trait" ranked 9 in importance and 3.5 in attainment. At least as far as student opinion is concerned, a suggestion for course improvement lies in such discrepancies as these.

In the original study a table was presented showing the percentages of judgments on attainment of objectives for each of the possible categories. Table 3 compares these original percentages with the percentages found in the present study.

TABLE 3
COMPARISON OF JUDGMENTS OF ATTAINMENT OF OBJECTIVES—IN PERCENTAGES FOR ALL OBJECTIVES TOGETHER

Rating	1	2	3	4	5	Total
Original %	24.8	40.0	26.4	6.6	2.2	100.0
Present %	38.3	44.5	14.3	3.0	.2	100.0

Table 3 indicates that some improvement has probably been achieved in the attainment of stated objectives in the time that has elapsed between the two samples of student opinion.

SUMMARY

A group of college women who had just completed their first course in Psychology were asked to express their opinions as to how important 15 stated objectives were for them, and also to indicate how well they thought these same objectives had been attained in the course. Results indicated that students considered the objectives to be of substantial importance, but that there was only a fair degree of relationship between how important an objective was judged to be and how well it had been attained in the course.

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SENSORY CONTROL AND RATE OF LEARNING IN THE MAZE*

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In comparison of the behavior of Tryon's "maze-bright" and "maze-dull" strains of rats under conditions which allowed expression of a preference between visual and spatial cues Krechevsky (4) found that the dull strain reacted predominantly to visual, the bright strain to spatial aspects of the problem. Tryon's rats were selected on the basis of rate of maze-learning. The fact that such selection isolated strains unlike with respect to the dominant sense modality raises a question concerning the degree to which differences in maze-learning ability within an unselected population are dependent upon the "sensory type" of the different individuals.

Tryon himself was unable to demonstrate any significant rôle of vision in the final accuracy of performance of his rats, but did not test visual function during learning (7, 8). With an elevated maze Dennis and Gersoni (2) found a significant disturbance subsequent to blinding. They state, however, that there was no discernible relationship between the initial learning scores and the amount of disturbance following loss of vision. They tested their animals 24 hours after enucleation of the eyes and it is likely that operative shock obscured differences due to visual loss. Finley (3) reported a correlation of 0.24 ± 0.11 upon practice for learning and subsequent tests in darkness with an elevated maze. She apparently used only the first five trials of training as a measure of learning and this amount of practice is inadequate to eliminate systematic exploration or give a reliable index of individual differences in learning.

A number of other experimenters have tested the effects of elimination of vision upon maze performance but they have been concerned with average effects and not with individual differences. The view is generally held that individual differences in the rate of maze learning are dependent upon the "associative capacity" of the animal and are relatively independent of the preferred sense modalities (8, 1).

In an experiment on the effects of loss of vision upon maze performance

*Received in the Editorial Office on July 5, 1943

I have obtained evidence that sensory preference or dominance may contribute significantly to individual differences in learning scores. Nineteen fully pigmented rats were trained in an enclosed maze of 8 culs de sac (5, Maze III) to a criterion of five consecutive errorless runs. After a 10-day rest period followed by retraining the rats were blinded by enucleation of the eyes and 10 days later again trained to the criterion.

The maze was so placed that light from a window provided a directional cue for the turns in successive alleys. To tame them, the rats had been trained in visual discrimination immediately before introduction to the maze. These conditions may have contributed to the greater dependence of this group upon vision than usually has been found in studies with the enclosed maze.

TABLE 1

Initial learning Trials	Initial learning Errors	Preoperative retention Trials	Preoperative retention Errors	Post-blind retention Trials	Post-blind retention Errors
17.4±1.2	50.4±3.9	25±0.5	1.4±0.2	11.6±1.6	46.3±7.1

Average scores for the group are given in Table 1. Relearning scores after blinding ranged from one trial with one error to 42 trials with 178 errors, the latter figure almost double the maximal training required for initial learning.

Rank order correlations have been computed between the post-blind relearning scores and initial learning. The coefficients are: for trials, $r = 0.44 \pm 0.13$; for errors, $r = 0.48 \pm 0.12$. The correlations are reliable and indicate that the slow learners among the normal animals tend to be those most dependent upon vision.

The data do not reveal the basis of the visual dominance, whether due to some other sensory defect such as anosmia or to individual differences in higher level organization, such as are suggested by a visual space factor (6) in human performance. The failure of many investigators to detect a significant reduction in rate of maze learning after elimination of single sense modalities makes it improbable that the individual differences indicated here are due to sensory deficiency. Krechevsky's experiments show that such differences may be constitutional and suggest a possible point of attack upon problems of genetic differences in sensory type.

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Yerkes Laboratories of Primate Biology
Orange Park, Florida

BOOKS

The Journal of Genetic Psychology, the *Journal of General Psychology*, and the *Journal of Social Psychology*, will buy competent reviews at not less than \$2 per printed page and not more than \$3 per printed page, but not more than \$15.00 for a single review.

Conditions. Only those books that are listed below in this section are eligible for such reviews. In general, any book so listed contains one or more of the following traits: (a) Makes an important theoretical contribution; (b) consists largely of original experimental research; (c) has a creative or revolutionary influence in some special field or the entire field of psychology; (d) presents important techniques.

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- SHELDON, W. H. *The Varieties of Temperament*. New York: Harper, 1942. Pp. 520.
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CRITICAL REVIEWS OF RECENT BOOKS

The Journal of Genetic Psychology, 1945, 66, 149-155.

(Gesell, A., & Ilg, F. L. *Infant and Child in the Culture of Today*. New York: Harper, 1943. Pp. 399.)

REVIEWED BY GEORGE G. THOMPSON

In this book the authors attempt to define a democratic culture as it affects the child's growth and development. They emphasize the need for an adequate philosophy of child development to be used as a guide in the social planning of our democracy. The major thesis of the book is that democratic procedures should be used in the rearing of children—children who in later years will be expected to live in and contribute to our democratic society.

This book will appeal to a wide and diversified group of readers because of its simple style and its authoritative presentation. An effort has been made to present ideas and suggestions that can be easily understood and appreciated by parents, inexperienced nursery-school assistants, social workers, physicians, and the like. This appeal to readers who may be relatively unfamiliar with the principles of child care and training has resulted in a superficial discussion of many of the aspects of child growth. The authors have drawn heavily on their own observations in the Yale Clinic of Child Development. The research findings of other competent scientists in this field have been almost completely ignored and controversial issues have been neatly resolved by presenting only the authors' point of view. Glib generalities, similar to the following example, may disturb the thoughtful reader. "Every living organism strives to attain a maximum of maturity. The spirit of liberty has its deepest roots in the biological impulse toward optimal growth." "The persuasive approach frequently takes precedence over the scientific in the authors' discussions.

However, this book has several strong points which make it a distinct contribution to the literature on child growth and development. The authors have the high purpose of encouraging parents to rear their children in a democratic fashion. They provide practical information for the inexperi-

enced parent and they demonstrate how the nursery school can be used as a guidance center for parents as well as for young children.

This book is divided into three parts. Part One, entitled *Growth and Culture*, includes a general and rather philosophical discussion of the family's function in a democratic culture. The manner in which the child develops in mind, personality, and physique is summarized. Emphasis is placed on the desirability of self-development and the adjustment of the culture to the child's *natural* growth toward adulthood.

The authors' attitude toward child development is illustrated in the following excerpts from their writing:

The child as an organism and the environment as culture are inseparable. Each reacts upon the other. The reactions of the child are primary: he must do his own growing. The culture helps him to achieve his developmental potentialities, helps him to "learn," but the process of acculturation is always limited by the child's natural growth process. Child and culture come into conflict when the two processes are not balanced and accommodated to each other (p. 4).

The mind is a growing myriad of reaction patterns which mirror the physical world in which the child is reared. It grows not unlike a plant. But the mind is also a person, and as such it mirrors the reaction patterns of a world of persons (p. 27).

The impacts of culture are incessant and often they tend to produce uniformity, but even the tender infant preserves an individuality, through the inherent mechanisms of maturation. We may be duly thankful for this degree of determinism. Did it not exist, the infant would be the victim of the malleability which behaviorists once ascribed to him. He is durable as well as docile (p. 41).

The authors argue that the child should be given an opportunity to "unfold." Throughout their discussion *maturation* is high-lighted and *learning* is either disregarded or cast in suspicious quotation marks. There is an abundance of evidence in the child development literature which demonstrates that mental growth is more than a passive process of "mirroring the physical and social worlds" with which the child comes in contact. Research has shown that maturation sets some restriction on child development, especially in the area of motor development. However, research has also demonstrated that the child is quite "malleable" with respect to his intellectual, social, and emotional growth.

The following statement shows that the authors have not informed themselves about current curricula in educational psychology.

The professional training of school teachers should include a liberalizing acquaintance with the developmental psychology of infancy to off-

set the stilted textbook limitations of an educational psychology too narrowly based on a study of "the learning process" (p. 4).

The most recent and widely-used books in educational psychology devote almost half of their discussion to child growth and development. The criticism might be directed against the present authors that they need a "liberalizing acquaintance" with the psychology of learning.

In the latter portion of Part One of this book the stages of child development are defined and discussed in a critical manner. Two types of time are defined: organic and clocked, the former being based on the "wisdom of the body" and the latter on "astronomical science and cultural conventions." The child "is not made to live by the clock on the wall, but rather by the internal clock of his fluctuating needs." The parent whose child regresses in toilet habits or in other behavior habits may obtain reassurance and a degree of understanding from the following exposition on developmental trends.

Development does not proceed in a straight line, it deviates now up now down, now left now right. Sometimes it even seems to deviate now backwards now forwards; but the total trend is forward. If the deviations and the slips are not too many and too extreme, the organism catches its balance at each step and then makes another step onward. The fluctuations are really not lapses: they are groping "efforts" of the organism to reach a further organization (p. 50).

Such teleological interpretations as "groping efforts of the organism to reach a further organization" and the mind growing "not unlike a plant" are theories which are not accessible to modern experimentation. The authors might better have restricted their writing to the available facts—at least for layman consumption.

Part Two, entitled *The Growing Child*, includes the most practical contributions of this book. A section is devoted to the mother's physical and psychological preparation for her first child. Psychological preparation for the coming of the second baby is also discussed. Many of the concepts presented in this section are of medical origin and should be helpful to the expectant mother. Mothers are advised to breast feed their babies whenever possible and a rooming-in arrangement, baby and bassinet kept in the mother's room, is recommended. The psychological advantages of the rooming-in arrangement during hospitalization are stressed. The mother feels more secure when she has the baby with her. Such an arrangement also permits the mother to observe the nurse as she bathes and dresses the baby; this is a valuable learning experience for the inexperienced mother.

In Part Two the authors also present a rather complete description of the behavior that is typical of infants and young children at the following ages: 4, 16, 18, and 40 weeks; 15 and 18 months; and 1, 2, 2½, 3, 4, and 5 years. These descriptions of typical behavior at the various ages include examples in the areas of sleep, feeding, elimination, bathing, dressing, self-activity, and sociality. The materials for these behavior profiles were selected from actual observations and records made by the authors and their associates in the Yale Clinic of Child Development and its affiliated nursery school. At the older ages, beginning at 18 months, typical nursery-school behavior and techniques and procedures to be used in guiding nursery-school children are presented. Examples of cultural and creative activities which are characteristic of the older children are also given.

That the "behavior day is not set up as a model, but as a suggestive example" is carefully stated by the authors. The reader is encouraged to regard with suspicion all inflexible age-norms. "No two infants develop in precisely the same manner at precisely the same pace in every detail."

To illustrate the type of material presented in the behavior profiles an example from EATING at the two-year-old level is given:

Refusals and Preferences—This is the age when the child is spoken of as "finicky" or "fussy." Now he is able to name many foods and has more definite ideas about what he likes. "I want," or "Billy wants" is a common expression at this age. His affection is not only shown toward his mother but also toward the foods that he eats. His sense of form makes him prefer whole things—whole beans, whole pieces of potato—unless he demands the extreme opposite, i.e., the continuation of puréed foods. He does not like foods mixed up, such as gravy on his potato or milk on his cereal, unless, of course, he does the mixing himself. His preferences may be related to taste, form, consistency, or even color, red and yellow foods often catching his fancy. He is apt to repeat his demand for one food, but finally he drops that food completely and goes off on a different food jag (p. 164-165).

From the above excerpt it can be seen that the authors' description of typical behavior is quite general. Characteristic behavior at the various age levels is described within rather broad limits, so that parents will not be able to make accurate comparisons between their child's behavior and the "norm." This type of presentation is probably the most informative and also the least disturbing to parents who want to rear their child by the "book."

Although few research workers in this field would agree completely with

the authors on what constitutes a typical "behavior day" at the various ages, the descriptions of Gesell and Ilg provide a general guide which is far superior to no information at all about the trends in child growth and development. This part of the book should be extremely useful to parents and other people who come into daily contact with small children.

In the latter portion of Part Two a convincing argument is given for using the nursery school as a guidance center for parents. The pro's and con's of nursery-school attendance are carefully analyzed. A nursery school that has the guidance of child development as its principal purpose is recommended. The authors' analysis of the different types of nursery schools is especially appropriate at the present time, since so many nursery schools have been established to care for the children of mothers who are working in war industries.

A nursery unit may aim at three related but distinguishable objectives. It may concern itself mainly with semi-custodial care of the children ("minding care," as it is called in England). It may conduct its work on a pre-kindergarten basis, for the avowed purpose of "training the children in good habits." Or, finally it may conceive its work in terms of guidance,—developmental guidance for the children, educational guidance for the parents. These two forms of guidance are inseparably interrelated and they are typical of the progressive nursery in the culture of today (p. 281-282).

Part Three, entitled *The Guidance of Growth*, includes the authors' philosophy of child development in the culture of tomorrow. A plea is made for better homes, more economic security, and more adequate recreational facilities. It is suggested that during the reconstruction period after the present war one of the most ameliorative social forces could be "an intensified conservation of the development of infants and young children." Such a conservation might be a prophylaxis of war. "For how can we ever overcome systematic destruction of life, if life and growth are not cherished at their source." Regardless of its influence on future wars the conservation of young and older children alike seems to be a desirable attitude for parents in a democracy.

Corporal punishment of children is condemned by the authors as a primitive, outmoded form of discipline. "These primitive, undemocratic methods of discipline have no place in the culture of tomorrow. They are grossly inconsistent with the spirit of democracy, and as such they must be reached and overcome by public health and education measures."

Also discussed in Part Three are some of the more obvious aspects of child development such as sleep, thumb-sucking, feeding, bowel and bladder con-

trol, personal and sex interests, self-activity, sociality, and the like. These areas of development are the ones which most frequently disturb conscientious parents. The emphasis in these discussions is placed on maturation; habit and learning are minimized. Great reliance is placed in the "wisdom of nature" in establishing satisfactory toilet habits. "The culture is inclined to be too meddlesome and too emotional." The authors in this section give little aid to parents whose children are "unfolding" in a socially unacceptable manner. Advice to stand back and let nature take its course is not very helpful when undesirable habits have become well established in the child.

Although the authors' philosophy of development may not be too helpful to parents who feel that their children are seriously deviating from a normal pattern of behavior, some of their statements should do much to prevent parents from being over-anxious about their children's "problems."

One does not have to be so soberly solicitous and grimly determined after all. Of all natural phenomena none is more variegated and marvelous than the cycle of child development. No spectacle offers a more intriguing mixture of the unpredictable and the predictable. Why not enjoy it? (P. 297.)

The appendix of this book should not be overlooked since it contains some of the most useful information. Appendix *A* includes samples of behavior charts which may be copied for use by interested parents. Appendix *B* contains a description and sketches of the Yale Guidance Nursery, showing what can be done to develop a desirable nursery-school plant. Appendix *C* provides a list of toys, play materials, and equipment which are suitable for children of various ages. This list is a valuable guide for parents who may have a tendency to buy impractical toys for their children. Functional toys are recommended. "Improvised and casual materials such as clothespins, discarded containers, firm cloth, clean short lengths of rope, and similar materials are often superior to more elaborate manufactured toys." Appendix *D* includes lists of story collections, picture and story books, books of poetry, information books, and song books which can be appropriately used at the various age levels. The publishers of these various books are also given so that interested parents can order them directly from the companies if they wish. These lists are by no means exhaustive; however, the selections are well made and these books could provide a nucleus around which a larger library could be built in the home or in the nursery school. Appendix *E* presents a list of musical records for infants and young children. The composition, composer, and the artist or artists making the recording are

given. The records are not presented according to age levels, because, as the authors point out, children show a great range of interest and ability in music appreciation. Appendix *F* includes a list of the more popular books on child development and nursery education. A list of the publications of Gesell and his associates is also given.

The physical attractiveness of this book is greatly enhanced by a series of pictures in the front and the back which show babies and young children at various levels of development. These pictures show babies being fed, bathed, and dressed. They also show young children during the various stages of locomotion, during toilet routines, and during the various stages of socialization.

In summing up the merits and the weaknesses of this book, it should be remembered that it was written not for the scientist but for the laymen. The materials presented should appeal to the novice in child development. If the book is read by a sufficiently large number of parents, teachers, nurses and physicians, it should have a noticeable effect on the nursery-school movement in this country. The authors' plea for a wider and more thorough-going use of democratic principles in the rearing of young children is a noble contribution to democratic philosophy. The practical information that can be gleaned from the behavior protocols by intelligent parents should be extremely valuable.

On the debit side too many tongue-rolling theories are stated as established scientific facts. The cautious research worker will question the accuracy of many of the statements in this book, especially those that appear so frequently in Parts One and Three. However, it should be noted again that this book was not written for fellow scientists. Nevertheless, one may wonder whether the book might not have been improved if some of the development theories had been omitted.

In the reviewer's opinion the greatest weakness of this book is its extreme emphasis on maturation and its almost total neglect of the learning process. It is to be hoped that the authors' emphasis on maturation will not blind the unsophisticated reader to the fact that, in addition to maturing, young children also learn. Not only do children learn, but much can be done to guide their learning activities.

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BOOKS RECENTLY RECEIVED

(There will always be two pages of book titles, listed in the order of receipt, i.e., the most recently received books will be found at the end of the list.)

- GRAUBARD, M. *Man's Food: Its Rhyme or Reason.* New York: Macmillan, 1943. Pp. 213.
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June, 1945
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Volume 66, Second Half

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FREE DRAWING AND COMPLETION DRAWING: A COMPARATIVE STUDY OF PRESCHOOL CHILDREN*

Clinic of Child Development, Yale University

LOUISE BATES AMES

A. THE PROBLEM

This paper is offered as a supplement to an earlier study entitled: *The Gesell Incomplete Man Test as a differential indicator of average and superior behavior in preschool children* (1). In that study, responses at varying ages in children of average and superior intelligence to the incomplete man test were analyzed to determine number, kind, order, size, angle, placement, and direction of parts added to the partial form. Marked performance and developmental differences were found for the two groups of children. The superior children not only added more parts at each age level but exhibited many behaviors never seen in the average children.

In the present paper the responses to the free drawing of a man and the completion of an incomplete man are compared for contrastive groups of average and superior children. This comparison enables us to inquire whether the stimulus value of the partial form of the incomplete man test induced performances which were significantly different from those of the spontaneous situation. In other words, does the drawing of arm, leg, ear, etc., occur at a certain age regardless of the aid of a partial form or does a form which provides single members of these paired parts accelerate their emergence?

B. PROCEDURE

In the *draw-a-man* test the child is furnished with a piece of paper and pencil and is given the instruction, "*Now draw a man.*" No model or other specific suggestion is given. In the *incomplete man* test, however, a form representing a man having a body, head, nose, mouth, and necktie as well as one arm and hand and one leg and foot, one ear, and some hair, is provided. The child is asked, "*What is this?*" If he does not answer, he is told that it is a man. The instruction is given, "*The person who made this man didn't draw all of him, did he? You finish him.*" If the child makes no

*Accepted for publication by Arnold Gesell of the Editorial Board, and received in the Editorial Office on August 20, 1943.

attempt to draw, he may be told, "*See, he has only one ear. Draw his other ear.*"

These two tests were administered under standard conditions to 241 pre-school children from 2½ to 6 years of age: 141 children of average intelligence, members of the Yale Normative Group; 100 children of superior intelligence, examined in connection with the diagnostic service and the work of the Guidance Nursery. The free drawing situation always preceded the completion drawing.

C. FINDINGS

The average number of parts included in draw-a-man and the average number of parts added to the incomplete man form were computed for both groups (Table 1). In both groups of cases the incomplete man has the most parts at the earliest ages; but draw-a-man has the most parts at 5 years and thereafter in the average cases, at 6 years in the superiors. This trend holds true not only for the group averages but for the majority of the individual cases.

For the most part, when an item is present singly in the incomplete man form, the other of the pair is added at an earlier age in the incomplete man than the age at which it appears in draw-a-man. When an item is not present in the incomplete man form, it occurs at the same age in both situations, or earlier in draw-a-man.

The kinds of *fingers* and kinds of *eyes* drawn by subjects of both groups, in both situations, were studied in detail. *Fingers* are added first to the incomplete man, appearing at 4½ years in the average cases, at 4 years in the superior cases. They do not occur in draw-a-man until 6 years in the average cases, and 5 years in the superiors. The three-finger form appears to be the most primitive form in both situations, and persists as the predominant form in incomplete man at all ages. The three fingers given in the incomplete man figure probably influence the response since there is more variety of form in draw-a-man. The developmental trend occurring in fingers in draw-a-man is: a continuation of the arm, three fingers, a two-dimensional outline.

The trend in kinds of *eyes* drawn, for both average and superior cases and for both draw-a-man and incomplete man situations is from open circles to solid dots. In both groups of cases the change from open circle eyes to solid dots occurs one age level earlier in the incomplete man than in the

TABLE 1
NUMBER OF PARTS: DRAW-A-MAN AND INCOMPLETE MAN

Age	Draw-a-man	Incomplete man
<i>Average cases</i>		
3 yrs.	1 (head)	2 (eyes, leg)
4 yrs.	2 (head, eyes)	3 (arm, leg, foot)
4½ yrs.	3 (head, eyes, legs)	6 (eyes, leg, foot, arm, hand, umbilicus)
5 yrs.	8 (head, eyes, nose, mouth, trunk, legs, feet, arms)	7 (eyes, ear, hair, leg, foot, arm, hand)
6 yrs.	10 (head, hair, eyes, nose, mouth, trunk, legs, feet, arms, fingers)	8 (eyes, ear, hair, neckline, leg, foot, arm, hand)
<i>Superior cases</i>		
2½ yrs.	0 (scribble)	3 (eyes—or leg—, ear, arm)
3 yrs.	3 (head, eyes, leg)	3 (eyes, leg, arm)
3½ yrs.	4+ (head, eyes, nose, mouth, legs)	4 (ear, leg, foot, arm)
4 yrs.	6 (head, eyes, nose, mouth, trunk, legs)	6 (eyes, ear, leg, foot, arm, hand)
4½ yrs.	7 (head, eyes, nose, mouth, trunk, legs, feet)	7 (eyes, ear, neckline, leg, foot, arm, hand)
5 yrs.	9 (head, hair, eyes, nose, mouth, trunk, legs, arms, hands)	9 (eyes, ear, hair, neckline, leg, foot, arm, hand, + one other)
6 yrs.	12 (head, eyes, nose, mouth, hair, neck, trunk, legs, feet, arms, fingers)	9 (eyes, ear, hair, neckline, leg, foot, arm, hand, + one other)

draw-a-man test. Eyes first become solid dots in over 50 per cent of the cases as follows:

Average cases: draw-a-man, 6 years (58%); incomplete man, 5 years (55%).

Superior cases: draw-a-man, 5 years (50%); incomplete man, 4½ years (50%).

Typical draw-a-man products for each age level for the average group are presented in Column 1 of Figure 1. Typical draw-a-man products for each age for the superior group are presented in this same figure, as well as the poorest and best products of children in this group. For illustrations of typical responses to the incomplete man test by both groups of children, reference is made to the study on the incomplete man (1).

D. CONCLUSIONS

In the drawing of a man, when a single member of paired parts (arm, leg, etc.) is provided in a partial form, the other member of the pair is added at an earlier age than in the free drawing situation. Parts not provided in

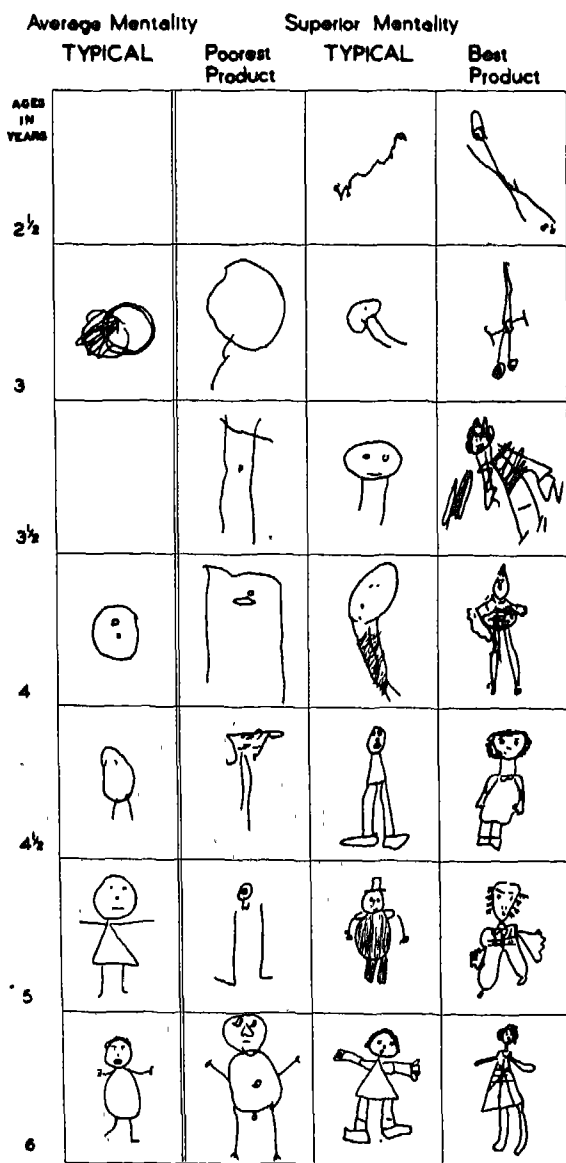


FIGURE 1

DRAWINGS OF A MAN BY PRESCHOOL CHILDREN OF AVERAGE AND SUPERIOR MENTALITY

the partial form appear at the same age in both situations, or earlier in free than in completion drawing. As to actual number of parts produced, in both average and superior cases the completion drawing (incomplete man) has the most parts at the earlier ages; but the free drawing of a man has the most parts at 5 years and thereafter in the average cases, at 6 years in the superior cases. This suggests that the help of a partial form advances behavior at the earlier ages when it is just emerging, but actually hinders performance at later ages. The presence of one of a pair of parts makes more likely the addition of the second part, but a partial form prevents the addition of elaborations, which occur more frequently in entirely spontaneous drawings.

Findings of this study confirm the importance of maturational over situational factors in the emergence of drawing behaviors. Laws of sequence seem to determine the order in which the various parts (of a man) appear, regardless of whether drawing is of a free or completion type or whether the subjects fall within the average or superior classification of intelligence. (A slight modification occurs in the incomplete man when some subjects add a leg before eyes.)

A partial figure by suggestion can definitely hasten the addition of parts to the drawing, but does not distort the order in which they emerge even when certain parts are suggested by a form. Thus eyes, which appear first (after the head) in free drawing tend to appear first in completion drawing, even though arm and leg and *not* eyes are suggested by the form.

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A COMPARATIVE STUDY OF DEVELOPMENTAL, ADJUSTMENT, AND PERSONALITY CHARACTERISTICS OF PSYCHOTIC, PSYCHONEUROTIC, DELINQUENT, AND NORMALLY ADJUSTED TEEN AGED YOUTHS*¹

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There have been a number of clinical studies on psychotic children and adolescents published within recent years as well as reports (both sociological and psychological) on the child delinquent. These descriptive and clinical studies for the two groups, when compared with each other, show some interesting differences that might be checked by a controlled experimental procedure.

The first author's previous study of prodromal factors in various psychotic and psychoneurotic reaction types emphasized the etiologic and prognostic importance of developmental and personality characteristics of childhood up to and including the teen ages. If these factors are found to significantly differentiate psychotic, delinquent, and control subjects the results will be of importance for parents, educators, and mental hygienists in particular and for every professional group interested either directly or indirectly in prophylactic measures in the fields of mental illness and delinquent behavior.

This paper presents the results of a comparative study of the developmental, personality, and adjustment characteristics of teen age subjects (15 years of age up to 20 years of age) classified according to reaction type. Objective test findings are compared, together with evaluations of the social service history data for the E.S.H. patients, the pre-parole investigations and court histories on the delinquents, and the home room and councillor's data on the control group.

*Received in the Editorial Office on October 9, 1943.

¹This study has been made possible through the cooperation of Dr. Charles F. Read, Superintendent, Elgin State Hospital; Mr. O. E. Patterson, Superintendent, Elgin Public Schools; Mr. R. W. Ballard, Managing Officer, Illinois State Training School for Boys; and Mrs. Elizabeth Lewis, Managing Officer, Illinois State Training School for Girls.

²At present Director of Educational Survey in Afghanistan, with headquarters at Kabul, Afghanistan, Asia.

The experimental subjects include teen age patients at the Elgin State Hospital and inmates of the State Training Schools, for boys at St. Charles and for girls at Geneva, Illinois. Thus the experimental groups include two types of maladjusted teen aged youths, those whose maladjustment is primarily in terms of personality deviations or organic pathology (Elgin State Hospital patients) and those whose maladjustment is in terms of overt anti-social behavior (the St. Charles boys and Geneva girls). The control group consists of Elgin High School students within the same age limits as our experimental groups, that is, 15 years up to 20 years. The only selection of cases was on the basis of coöperativeness and an educational qualification of at least 8th grade or better.

The same test battery was used with all the subjects and consists of the Elgin Developmental History, Part I, the Guilford Inventory, and the Bell Adjustment Scale. The Elgin Developmental History, Part I, yields both quantitative and qualitative measures of the subject's parental relationships and of early home and school life. The Guilford inventory gives a picture of the strength of various personality components for each subject, and the Bell Adjustment Inventory^a yields scores indicative of adjustment in home, health, social, emotional, and occupational spheres.

Tables 1 and 2 give the sociological data, expressed in the form of averages (Table 1) and percentages (Table 2) for the different groups. The

TABLE 1

	High School		Training School		State Hospital	
	Girls	Boys	Girls	Boys	Girls	Boys
Number of cases	68	123	56	82	77	146
Chronological age (Av.)	16.23	16.09	16.1	16.32	16.8	16.5
Educational level (Av.)	10.6	10.4	9.6	9.8	9.9	9.6
Intelligence quotients (Av.)	—	—	108.6	101.6	103.6	99.7
Number of siblings (Av.)	1.4	1.3	2.3	2.1	1.9	1.7

average chronological ages for all the groups are within a year of each other and the range for each group is from 15 through 19 years of age. The educational levels are also roughly comparable, although the youngest groups (Elgin High School) have the most advanced grade placement on the average. However, this does not necessarily indicate a lower ability level for the psychotic and delinquent groups than for the controls since

^aThe adult form of the Bell Adjustment Inventory was used in this study rather than the Student's Form since our psychotic subjects and some of the delinquents were not in school and also because the Adult form of the Bell Inventory is one of a battery of personality scales administered routinely to all coöperative Elgin patients.

TABLE 2

	Elgin Girls %	High Boys %	State Girls %	Schools Boys %	State Girls %	Hospital Boys %
<i>Religion</i>						
Protestant	61.7	71.5	60.3	54.8	38.9	47.4
Catholic	26.5	20.3	39.6	43.9	28.6	25.6
Jewish	4.4	1.6	—	—	27.3	25.0
Agnostic	7.3	6.5	—	1.2	5.2	1.9
<i>Nationality</i>						
American	79.4	75.6	46.4	45.1	44.1	52.6
German	10.3	10.5	7.1	7.3	10.4	10.2
Scandinavian	8.8	5.7	1.8	2.4	15.6	9.6
Polish	—	0.8	7.1	12.2	9.1	9.0
African	—	2.4	10.7	9.8	2.6	3.8
Irish	—	1.7	8.9	6.1	3.9	4.5
English	—	0.8	3.6	1.2	—	1.9
Italian	—	—	5.4	6.1	7.8	4.5
Others	1.4	2.4	8.9	9.8	6.5	3.8
<i>Family Status</i>						
Both parents	86.7	90.2	19.6	36.6	80.5	88.4
Broken home	13.2	8.1	48.2	43.9	15.5	10.9
Foster parents	—	1.6	26.7	19.5	3.9	0.6
Illegitimate	—	—	5.3	—	—	—

some of the former (institutionalized) subjects had dropped out of school following 8th grade graduation at 14 and this brought down the educational averages for these groups as compared with the controls. The intelligence levels for the two institutionalized groups are average with however very wide ranges from a dull and backward level up to very superior intelligence. The controls are certainly intellectually equal, if not superior, to the other groups, and as upper grade high school students they are already a select group. However the requirements for taking the various scales were such as to force a selection of cases with at least a low average level of intelligence so that in this sense *all* our groups are selected. Consequently the *IQ* averages found for the psychotic and delinquent groups in this study cannot be considered characteristic of psychotic and delinquent groups in general.

The average number of siblings for each group shows just the opposite trend from that for educational level, with the delinquents highest, the psychotic next, and the controls lowest. These differences between the control and two experimental groups may be directly related to the socio-economic status for the different groups. Several sociological studies have pointed out the negative correlation between birth rate and socio-economic status. There are also several other factors that directly influence this relationship however,

such as nationality and religion, so that the socio-economic factor in this connection may be merely an artifact. The largest number of siblings, for subjects in the delinquent group, is twelve, for psychotics, seven, and for the controls, five. There are an approximately equal number of only children for the delinquent and control groups with a larger number among the psychotics but this difference is not a significant one.

Table 2 lists, in percentage form, the religious affiliations, nationalities, and the present family status for the different groups.

For all groups the majority were Protestant in religion and of American nationality—that is with parents born in this country. A much larger number of Catholics were found among the delinquent than among the other groups. This no doubt is related to the different types of nationality represented since for the relatively large number of Polish, Irish, and Italian youths among the delinquents, Catholicism is the national religion. A significantly high percentage of youths of Jewish religion are found in the psychotic group, a very small percentage among the controls and, interestingly, none at all among the delinquent youths studied.⁴

These findings are in striking accord with the difference in incidence of religious affiliations pointed out in many studies on chronic alcoholics as compared with other groups. Many investigators have noted the large percentage of Catholics among chronic alcoholic cases and the extremely low number of Jewish religion as contrasted with the psychotic and psychoneurotic populations. These findings suggest that for certain types of anti-social behavior, such as delinquency and chronic alcoholism, the cultural milieu and the religious and social mores of the varying nationalistic groups are particularly significant.

A relatively small percentage of agnostics were found in the delinquent group and a definitely larger percentage among the controls. However, this may also be an artifact due to the nationalistic weightings among the three groups since with only two exceptions the agnostic youths were among native Americans.

The much higher number of youths with American born parents among the controls as compared with both the delinquents and psychotic groups

⁴In order to rule out any possibility that these findings were artifacts associated with our sampling of the delinquent youths the percentage of religious affiliations for each school population was furnished us by the Managing Officers of the respective institutions. The data for the populations of the two schools is given below.

	Geneva girls	St. Charles boys
Protestant	60%	68.32%
Catholic	40%	30.40%
Jewish	—	1.28%

would probably be expected. The conflict resulting from the differing cultures of home and environment for the youths with foreign born parentage is well known. Our findings suggest that this conflict may be a contributing factor to the youth's maladjustment, resulting in either a compensatory, overt, and aggressively anti-social type of behavior as shown by the delinquents or the regressive, passive, and asocial type of maladjustment characteristic of many of the psychotic youths.

Levels of family status for the three groups corroborate the many sociological studies stressing the influence of broken homes in contributing to juvenile delinquency. More than 80 per cent of the adolescents in the control and psychotic groups had both parents whereas more than 40 per cent of the delinquents are from broken homes. Another finding is the large number of delinquents who had been in foster homes previous to their admission to the training schools. The writers had been inclined to think of foster home placement as a solution or at least a form of therapy for delinquency. These unexpected findings then, of a large number of the delinquents placed in foster homes previous to their sentence for delinquency suggests that foster home placement, per-se, means little and that if such placement does any good it certainly must be of an individualized type. These findings also bring up a question as to the validity of the recommendation, so frequently made by child clinics, of foster home placement. A follow up study of the effectiveness of such type of therapy for children with different types of behavior and personality problems is yet to be made.

Another significant finding is that 5 per cent of the delinquent girls were themselves illegitimate while this history is not recorded for any of the other groups. In this respect the delinquent girls differ from the delinquent boys as much as they do from all the other groups. This and the fact that a much lower percentage of delinquent girls than boys have an intact home situation is probably related to the marked difference in the *type* of delinquency for which the two groups are committed. All of the delinquent girls in this study were committed for sex delinquencies while offenses of the St. Charles boys were predominately those of stealing. None of the boys in this study were committed to St. Charles because of sex delinquency. This does not indicate that girls are more delinquent sexually than boys but *does* emphasize the difference in the standards of acceptable sex behavior for boys and girls and also reflects no doubt the greater maturity in emotional development and sex interests of teen age girls as compared with boys of corresponding age.

The parental relationships for the three groups psychotic, delinquent, and

control differ significantly. For the three groups both parents (but particularly the mothers) are rated very differently by their children. Figure 1 gives the adjustment score averages.

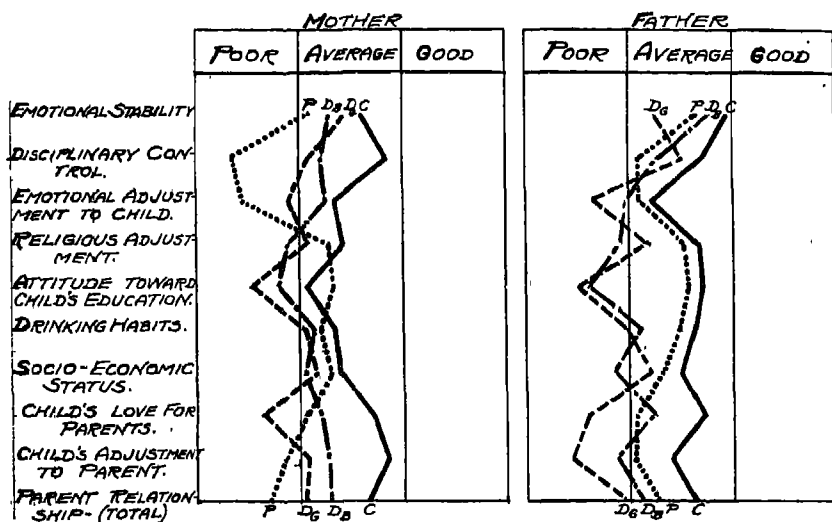


FIGURE 1
AVERAGE ADJUSTMENT LEVELS FOR PARENTAL RELATIONSHIPS

In general, the evaluation of their parents' traits by the psychotic and delinquent groups indicates type of family constellation conducive to poor adjustment. (Throughout the discussion of adjustment score findings on the Elgin Developmental History it must be kept in mind that the subject merely checks certain levels descriptive of behavior. The evaluation of adjustment potentialities for these levels was made by a group of psychologists, psychiatrists, and psychoanalysts at the time the scale was constructed.)

It is interesting, and in the light of other findings perhaps significant, that the average adjustment scores are poorest on mother relationships for the psychotic group while on father relationships the delinquent girls have the poorest adjustment averages. A study of father relationships for the different groups, subdivided according to sex, shows plainly that the answers of the delinquent girls are heavily weighted with levels indicative of poor adjustment while this is not so marked in the case of the delinquent boys. In fact, although there is greater homogeneity among the control and psychotic groups as units than between the boys of each group as compared with the girls the influence of the sex factor in the delinquent group is extreme.

Consequently although we had planned to evaluate the delinquents as a group we found it necessary to abandon that plan and will throughout this paper discuss our findings for the delinquent girls and boys separately.

In mother relationships the psychotic group have poor adjustment scores on disciplinary control, emotional adjustment to the child, child's emotional adjustment to the mother, and mother relationships with child (total). The delinquent boys have poor adjustment toward child's education. The delinquent girls have poor adjustment scores for mother's emotional adjustment to child, mother's attitude toward child's education, and child's love for parents. (The delinquent girls on the average indicated that they loved their mothers much more than their fathers while equal affection toward the parents rates a better adjustment score.) The controls have adjustment levels within the average range on all the factors under mother relationships.

On father relationships the delinquent girls have the poorest average with poor adjustment for father's emotional adjustment to child, father's attitude toward child's education, and child's adjustment to father. The delinquent boys have poor adjustment levels for some factors but the total father relationship is a low average. The psychotic adolescents and controls in father relationships fall within the average range, but, for the psychotic group there were great differences from one extreme to the other, that tended to cancel each other out in determining averages. It is interesting that for all the groups with the exception of delinquent girls the adjustment levels are better for father relationships than they are for mother relationships. This is even true of the control group and perhaps reflects the difference in the emotional closeness of mother-child relationship as contrasted with father-child relationships that are accepted and even encouraged in our present culture.

These adjustment scores indicate the type of *adjustment* that the parental relationships produce but they do not indicate the type of trait shown. For instance Factor 2 mother's disciplinary control, indicates poor adjustment for the psychotic youths and low average for the delinquent girls yet the *type* of disciplinary control is just the opposite for the two groups.

Consequently the *quantitative* scores as well as *adjustment* scores were found for each group. The quantitative scores describe the degree of the trait shown. For many factors either quantitative extreme is associated with poor adjustment and the more average or balanced expression of the trait with good adjustment.

On the basis of the E.D.H. quantitative scores for parental relationships we learn that the average delinquent girl in this study considers her mother

to have an average degree of solicitousness toward their child. The mother does not have any pronounced reaction to her child's interest in the opposite sex, an average degree of religious interest but with below average ambition for her child. The delinquent girl rates her mother as average in regard to drinking habits and socio-economic level. Our findings may be the girl's form of rationalization or idealization although this does not fit in with the negative ratings for their mothers that the delinquent girls have indicated on certain other factors. The Geneva girls on the average indicated much more love for their mother than for their father but even so only a low average emotional reaction to their mother.

The father of the delinquent girls, on the average, is depicted in extreme and negative terms as compared with the way the other group, including the delinquent boys, describe their fathers. The delinquent girl's father is described as of low average emotional stability, not at all solicitous or affectionately demonstrative, but a violent disciplinarian, with no ambitions for his child's future and with a low socio-economic status (rated definitely lower than mothers). The Geneva girl rates her love for father as definitely less than her love for her mother and her emotional reaction to her father is also a negative one. These last two factors may of course color (halo effect) the girl's entire rating of their fathers but, whatever the cause, there is a marked difference in the delinquent girl's evaluations of their two parents. It would appear that they identify themselves with their mother rather than their father and there is certainly no evidence on the surface of any Electra complex but rather the reverse, on a conscious level at least.

The delinquent boys rate their parents as average on most of the factors except mother's interest in outside affairs which is below average and mother's religious interests which are above average. The mother's low interest in outside affairs is no doubt related to the large number of siblings for the St. Charles boys and the large number of foreign born parents with a social culture that probably is somewhat narrow and restricted, particularly for the women of the family.

The psychotic patients rate their mothers as definitely below average in emotional stability and definitely over solicitous and over protective. They describe themselves, on the average, as dependent and with very strong emotional relationships with their mother. This is in contrast to the other groups and especially to the delinquent. The psychotic youths' evaluation of their father is, for the group as a whole, within average limits. It should be noted here that some individual patients gave extreme ratings but there

were no marked tendencies toward either extreme for the group as a whole and hence these extremes tended to cancel each other out.

The results of this study indicate that the parental relationships of teen aged subjects definitely differentiate delinquents, psychotics, and controls. On a scale with a negative, rejecting attitude on the part of parents at one extreme and an over-solicitous, dominating and hyper-emotional attitude at the opposite extreme the delinquents as a group rate their parents at the indifferent or rejecting end of the scale. The control's parents fall in the middle, i.e., the "normal" or average position, while the parents of the psychotic youths are rated at the over-solicitous, hyperemotional end of the scale. This suggests that parental relationships toward a child are of tremendous importance in influencing that child's behavior as an adolescent and no doubt as an adult also. The reaction and type of adjustment made by the child with indifferent, or rejecting parents appears to be of an overly compensatory sort, i.e., an aggressive, anti-social type of behavior. The children with the exact opposite type of parental relationship as a teen aged youth presents the picture of a severe personality disorder resulting in commitment to a state hospital. If this psychotic group is broken down into specific psychosis types there are quite drastic differences especially between the schizophrenic and neurotic adolescents at one extreme, i.e., with overly-solicitous parents and the affective and psychopathic cases near the middle but approaching the opposite extreme. The great majority of psychotic youths in our study are schizophrenic cases and this has no doubt influenced in a positive direction the differences between the groups. It is also possible that the schizophrenic weighting in our psychotic group is so strong that our findings for this group should be considered characteristic of the schizophrenic adolescent rather than psychotic adolescents in general. (We are continuing this study and plan to report on the specific psychotic types rather than all the psychoses together in a later paper.)

Education of parents stressing their relationships to their child is indicated by these findings. To the psychologist author (P.W.) this seems especially important for those parents (particularly mothers) with over-solicitous, hyper-emotional attitudes toward their children. A negative rejecting attitude on the part of parents is frowned upon in our present culture but there appears to be much more social acceptance of the doting, emotional but domineering type of reaction, somewhat more characteristic of mothers than of fathers at least in our present culture. Nevertheless our findings suggest that it is this type of parent-child relationship that is particularly malignant since it is so prevalent among psychotic youths and adults as well. It is

true that in certain cases this type of parental relationship may be cause rather than effect, that is, the difference, weakness, or peculiarities of the child may cause an overly protective attitude on the part of the parents rather than this attitude causing the child's maladjustment. It is probably a mutual, interacting relationship between this cause and this effect and the over-solicitous type of relationship with the child merely emphasizes those peculiarities that may already be present.

There are of course two ways of explaining these differences. The differences found may represent real differences between the parents of the groups or they may represent merely the expression of differences between the psychotic delinquent and control adolescents making the evaluations. The significant point however is the youth's evaluation of his or her parent whether the evaluations are objectively true or not.

Much stress has been placed recently on the importance of guidance, acceptance, and the expression of love and affection for the growing child by its parents. Certain authorities have even viewed with alarm the present tendency for mothers as well as fathers to engage in war work, feeling that they cannot therefore give enough attention to their children. The following quotation was given in a newspaper clipping. "But if all these extra-curricular assignments away from home mean that a mother must absent herself for long periods of time from her child, I would say that she had best watch out lest the child be starved for love." This was the statement made by the secretary of a round table discussion on mental health at the American Academy of Pediatrics at its twelfth annual meeting in Chicago, Illinois. This pediatrician also stated that contrary to popular belief doting grandmothers and grandfathers do *not* spoil their grandchildren through over indulgence, but act as a leveling influence in the child's life.

To the authors the picture in which the parents (and grandparents) foster feelings of dependence, insecurity, and overly close emotional ties is even more serious. Either extreme is bad for the adjustment of the child, as the results of this study indicate, but the prognosis and incapacitating features of personality maladjustments associated with the overly close parental-child relationships seem more severe than the misconduct of the delinquent which is associated with a negative rejecting attitude on the part of the parents.

Part I of the Elgin Developmental History⁵ is concerned with the subject's home and school life, that is, from earliest childhood up to 18 or 19 years of age. Figure 2 shows the average adjustment scores in early home and

⁵Part II of this scale deals with Adult Adjustment and was not given to the teen aged subjects in this study.

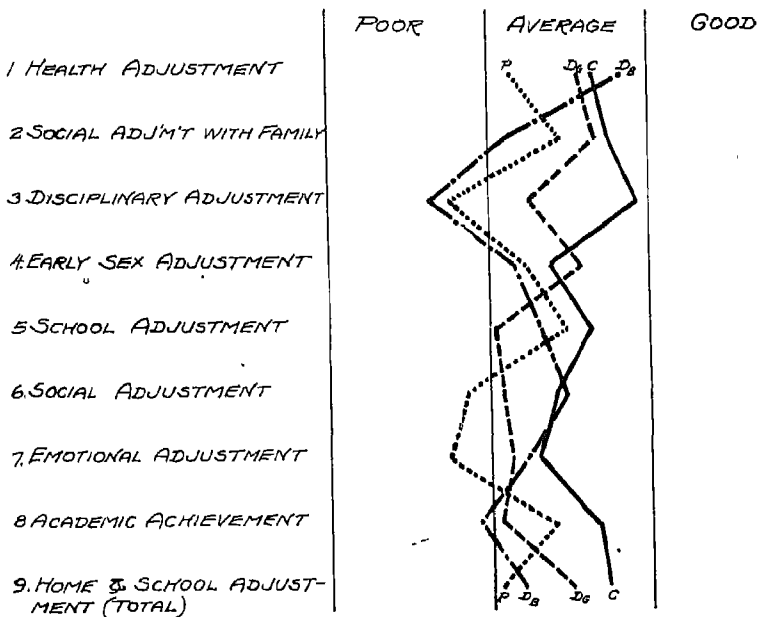


FIGURE 2

ADJUSTMENT LEVELS FOR EARLY HOME AND SCHOOL LIFE

school life for the psychotic (*P*) the delinquent girls (*D_g*) the delinquent boys (*D_b*) and the controls (*C*).

The delinquent boys (*D_b*) and the psychotic youths (*P*) both have scores indicative of poor disciplinary adjustment, and the social and emotional adjustments for the psychotic patients are also poor. Academic achievement for the St. Charles boys is in the poor range although they are only slightly below average in their evaluation of school adjustment.

Social adjustment, emotional adjustment, and academic achievement are also slightly below average for the delinquent girls but on none of these early home and school factors do they rate *poor* adjustment. These findings when contrasted with the adjustment levels in parental relationship suggest that, for the delinquent girls, their present maladjustment is primarily related not to personality difficulties within themselves, but to difficulties of adjustments within the family group and to their general environment. In this respect the delinquent boys more nearly resemble the psychotic patients and controls in that their maladjustment seems to be related to their own individual deviations from established patterns or norms as much

as to deviations within their environment. In other words for the delinquent boys, psychotic patients, and the controls the results suggest that both the individual and his developmental environment are equally important while for delinquent girls (i.e., sex delinquents) the developmental and environmental factors appear more important than personal ones.

The poor emotional and social adjustments for the psychotics are undoubtedly related to the large number of schizophrenics and schizophrenic reaction types among this group.

The quantitative scores for home and school life indicate that family friction is definitely greater in the delinquents families than for either the psychotic or control groups. Financial dependency on the part of the youth shows just the opposite picture, that is, it is more marked for the psychotic and controls than for the delinquent, whereas parental supervision and subject's submission to discipline is most marked for the psychotic group. Heterosexual interests are above average for the delinquent girls and below average for the psychotic group, as one would probably expect. School adjustment is highest for the controls while social adjustment is highest for the controls and also for the delinquent girls. Emotional stability is rated as below average only by the psychotic group.

Figure 3 shows the average adjustment scores for the experimental and control groups. Despite some rather marked differences on home adjustment

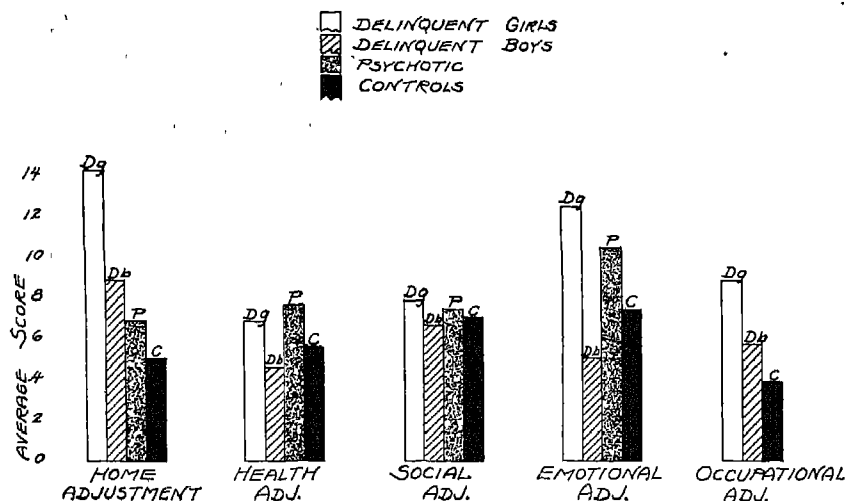


FIGURE 3
BELL ADJUSTMENT SCORE AVERAGES

and emotional adjustment, especially between the delinquent girls and the other groups, none of these differences are statistically significant. The wide range of scores for each group, from excellent to very poor adjustment in most categories, produced large standard deviations.

There is a definite overlapping between the different groups. However, on the basis of the adolescents own evaluation of their adjustment, the delinquent girls stand out as the most maladjusted in all fields except health in which the psychotic group has a slightly higher (i.e., more maladjusted) average. Maladjustment for the delinquent girls is most pronounced in the home situation. This agrees with the Elgin Developmental History results. In all fields of adjustment the teen aged psychotics as a group are not markedly differentiated from the other groups. (Too few of the psychotics had had occupations to rate a reliable average for this field.)

In Figure 4 the teen aged psychotic group has been broken down into the various diagnostic types, and the controls have been reclassified according to sex. The psychotic group was also divided according to sex, but showed little differentiation, thus corroborating the author's impression that the

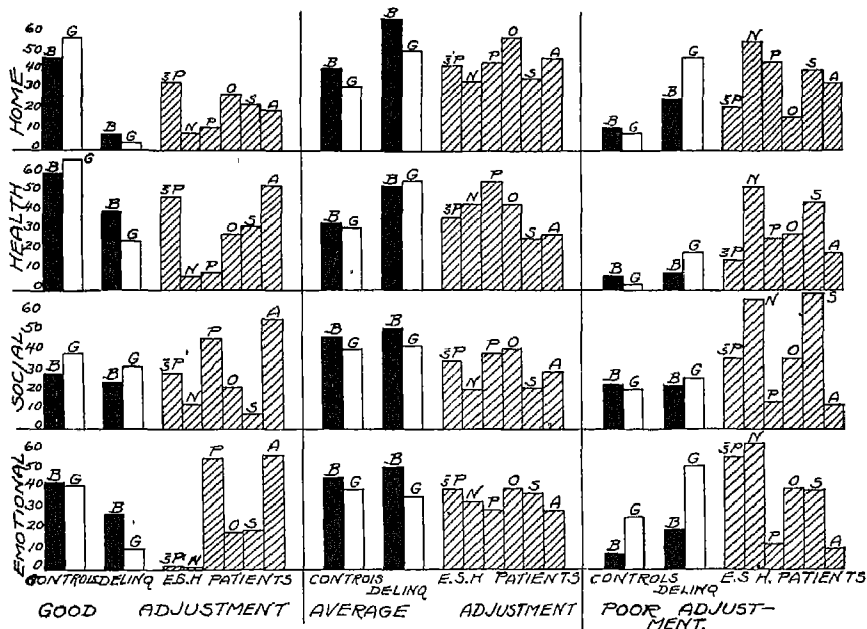


FIGURE 4

PERCENTAGE OF CASES FOR DIFFERENT DIAGNOSTIC GROUPS CLASSIFIED ACCORDING TO LEVELS OF ADJUSTMENT ON THE BELL INVENTORY

diagnostic group differences were much more extreme within the psychotic group than were the sex differences. The effective and psychopathic personalities are at one extreme of the adjustment continuum while the schizophrenic and neurotic youths are at the opposite extreme. (These positions are similar for these types in parental relationships except that here the position of the affective and psychopaths is much more extreme.)

In Figure 4 the greatest percentage of the controls and the delinquent boys D_B are in the average and good adjustment ranges. Most of the delinquent girls D_G are also in these ranges for health and social adjustment, but in home adjustment 44 per cent are maladjusted and in the emotional field 50 per cent rate as poorly adjusted. Among the psychotics the relatively poor adjustments of those teen aged patients diagnosed schizophrenics (S) and neurotic (N) is markedly in contrast with the relatively good adjustment of the affective (A) and psychopathic personalities (P).

This is perhaps what one would expect yet it is of corroborative significance that the objective results of a psychological inventory, answered by the psychotic youths themselves, agree so well with our present day concepts of the differing adjustment factors for these psychosis types.

The results of the Guilford Inventory of the factors, Social Introversion, Thinking Introversion, Depression, Cyclothymia and Rhathymia are shown

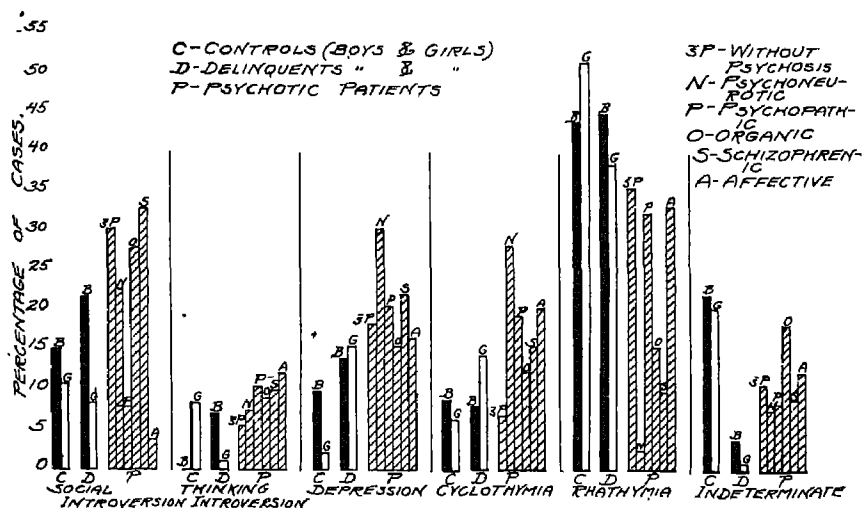


FIGURE 5

PERCENTAGE OF "TEEN AGE" SUBJECTS (CONTROLS, DELINQUENTS, AND VARIOUS PSYCHOTIC TYPES) CLASSIFIED ACCORDING TO THEIR STRONGEST PERSONALITY COMPONENT SHOWN ON THE "GUILFORD" INVENTORY

in Figure 5. The controls and the delinquents, and the teen aged patients diagnosed as without psychosis as well, are predominately of a rathymic personality type. The schizophrenic and organic patients were found to have social introversion as their strongest trait. The depressive and cyclothymic factors are strongest for the psychoneurotic youths while the psychopathic personalities and affective psychoses are strongest in the rathymic factor, thus resembling the controls more than the other types of psychotic patients.

Another classification, that of indeterminate, was used by the authors to include those cases with very low scores on all the components measured. For the sake of our reports, filed in the patient's folder, we describe such a test result as, "a mild colorless type of temperament without any particularly outstanding traits, due, either to the below average strength of the various components or to the rigid control and restraint under which temperament is allowed expression. However this is also the result found on a test in which the subject is not fully coöperating but is concerned with giving a 'normal' picture of his reactions rather than a 'true' picture." A relatively large number of the controls and organic cases fall into this category.

Evaluations of social service history data for the psychotic patients, and pre-parole investigations and court histories for the delinquents, yielded data that, in general, corroborates the statements made by the subjects themselves. In fact we were surprised at the corroboration of the subject's evaluations of their parents by the facts brought out in the histories and pre-parole investigations made by disinterested trained workers in these fields. (A special report will be prepared later giving the correlation between the adjustment factors stressed by the individual teen aged subjects and the evaluation of these factors in their social service histories.) The home room data for the control group did not yield enough information on familial relationships either to corroborate or disagree with the students' own ratings.

CONCLUSIONS

1. Delinquent, psychotic (schizophrenic), and control teen-aged subjects are differentiated from each other in respect to sociological data, self-ratings of parental relationships, particularly mother relationships, and early home and school life, as well as in personality type and adjustment levels.
2. The type of adjustment levels for the delinquent and psychotic groups during early home and school life can be considered prodromal factors related to the subsequent type of abnormality shown by the child and in some cases indicating the presence of abnormality during these years.

3. Personality type appears to be of diagnostic significance only for specific diagnostic types among the psychotic group and not for all of these.

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ERRORS IN THE ORAL LANGUAGE OF MENTALLY DEFECTIVE ADOLESCENTS AND NORMAL ELEMENTARY SCHOOL CHILDREN*

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A. INTRODUCTION

During the past 30 years, more than 200 articles, theses, and monographs have been written in the field of oral language and speech. Up to very recently, however, most work in this field, especially work on oral errors, has been limited to the exposition of theories and to the construction of curricula. Not more than 15 of these authors have made research investigations of school children's oral errors.

Various methods and techniques have been employed in studying children's errors in oral language. Children have been observed not only in classroom and playground situations, but also under more controlled conditions. Because educators were interested in checking their curricula for the teaching of grammar, it is only natural that the first experimenters in this field were school authorities and teachers. Thus, such experimenters as Charters and Miller (3), Fillers (6), Siers and Diebel (14), Starch (16), and Wilson (19) asked school teachers to observe and record the oral errors which their pupils made in the school room and on the playground. Usually these observations lasted from two or three days to a few weeks. Although this procedure of employing the teacher as observer and recorder went directly to the crux of the problem, the method was weak in that it took no account of the reliability of such observations and recordings. That is, such questions as, how well were the teachers trained to detect a certain group of oral errors, what correlations existed between different teachers' recordings, and what language situations were used for the purposes of recordings, were never answered adequately. It is reasonable to believe that oral errors, produced in a formal school situation under the strict surveillance of the teacher, would be different from oral errors produced by children spontaneously on the playground. Perhaps the greatest criticism that can be made of these studies, however, is the fact that no other experimenter could hope

*Received in the Editorial Office on November 23, 1943.

to reproduce these experiments because all conditions and controls were not mentioned.

In comparison with these direct investigations of children's oral errors by teachers, the Bushnell (2) and Goltry (7) experiments, completed in the early 1930's were better controlled and more reliable. In contrast to the teachers' method of randomly recording whatever they heard, these experimenters used a limited set of stimuli. They asked children to improvise oral compositions on certain definite subjects. Recordings were carried out by a court stenographer in the Bushnell investigation and by mechanical means in the Goltry study. A definite list of oral errors was set up as the criterion for investigation and all analyses of oral compositions were made with this criterion as a basis. In spite of the fact that reliability checks were instituted in these studies and conditions were much better controlled than in former studies, the situation to which the subjects were asked to respond and the environment for the production of oral language were intimately tied up with school and the classroom. Under these conditions, one would question the spontaneity of children's oral language and of the production of oral errors. With the teacher present in the guise of a censor, one would expect a diminution in the production of oral errors. In addition, the stimuli which Bushnell and Goltry used in their experiments were of rather limited utility. Only children of certain grade groups such as the eighth, ninth, or tenth, would have been interested in producing compositions on the particular subjects chosen by the researchers.

While Bushnell and Goltry worked with children in the upper intermediate and junior high grades, Smith (15) used pre-school children in her research study and Davis (4, 5) primary school children. The type of stimulus which Smith employed, the simple single picture; and the type which Davis used, namely, a varied group of small toy objects, were particularly suited for their limited age groups. Not only were these stimuli of limited utility, since they could not be used with older age groups, but also the conditions of both of these investigations were less controlled than were the Goltry and Bushnell studies. Both Smith and Davis state that in order to stimulate oral language responses, they asked the children supplementary questions. Since these questions were not a standard or prearranged list, one would have great difficulty in repeating their experiments.

Another point in the experimental methodology of this subject should be brought to the attention of the reader. This is that up to now all experimenters have studied the differences which existed between successive chronological age groups. Since each author selected, or intimated that he

had selected, normal samples, the factor of mental age was also permitted to vary from group to group. Within the writers' knowledge, no one has as yet compared an older age group with a younger age group when both groups have been matched for mental age and other relevant factors.

In light of the research work which has already been done in this field, we planned to investigate at least three factors. First, our plan was to measure the oral errors of children over a wide age range, in a more reliable and more valid manner than had been done previously. Conditions underlying this mensuration were to be controlled in the most practical manner possible. Second, since we were interested in holding constant more variables, we elected to make a comparative study of mental defectives in an adolescent age range with normal groups of children in the intermediate school range. We thought it wise that while chronological age was permitted to vary, mental age, socio-economic status, and sex should be controlled. Third, we were interested in exploring the practicability of standardizing a test measuring the oral errors of children, using our methods and techniques.

In designing an experiment to investigate these three factors we wished first to provide stimuli for the production of oral language which would be both novel and interesting to the child. These stimuli should be of interest to children of a wide age range, preferably from year 8 through 18. Second, we desired that these stimuli should call forth language responses readily from even the most inhibited child without any further stimulation by the examiner. Third, it was most important that the child's oral responses should be spontaneous and should simulate his every day speech. If the child could become so interested in the stimuli that he would forget his environmental surroundings, oral responses would as a matter of course be spontaneous. Fourth, all oral language had to be recorded accurately and reliably.

B. SELECTION AND ADMINISTRATION OF EXPERIMENTAL MATERIAL

After conducting preliminary experiments with various types of material which would stimulate the production of oral language by children, and after searching the psychological literature on this point, we concluded that a picture stimulus, from which all printed word cues were eliminated, would suit our purpose. Up to this time experimenters such as Smith (15), Shaffer (13), and Netzer (12) had used single pictures to stimulate oral language responses. However, we found that children made longer, more complex, and more interesting responses to a connected series of pictures which told

a little story. Accordingly, we fabricated eight¹ different picture sequences from two popular children's paint books (1, 10). Of the eight sequences, six dealt with the escapades of the comic strip character "Blondie," and two with those of the "Lone Ranger." Although we attempted some experimentation with picture sequences which were unfamiliar to children, we found that familiar sequences containing characters which the children could readily identify, stimulated more oral language and proved to have a greater interest value. Obtaining familiar sequences from comic strip books proved to be the easiest and most economical method of gathering this material.

Each series of pictures, consisting of from 6 to 14 individual pictures per series, was pasted on cloth and attached to rollers. In this way, each sequence could be wound picture by picture from one roller to the other. Each individual picture was $6\frac{3}{4}$ " by $8\frac{3}{4}$ " and printed in black and white. To eliminate the variable of reading disability, all reading matter was of course deleted.

In order to show off these picture sequences to the best advantage, and in order to provide a play situation for the child, a collapsible "peep-show," 18" high, 18" wide, and 2 feet long was built. In the rear of the show, a flap could be raised in order to insert the rollers of pictures in round slots. When the child was seated before this peep-show, the experimenter inserted a roll of pictures in the rear and switched on the footlights which illuminated the material. After explaining briefly that the pictures were in a connected sequence, the examiner then asked the child to tell the story about them as they were moved on the roller.² Since one of our objectives was to elicit as much spontaneous oral language as possible from the child, we adjusted the movement of the picture sequences on the roller to the child's rate and quantity of speech. This was done by exposing the first two pictures of the sequence to the child's view. The child was permitted to talk about these

¹By experiment we found that eight sequences would stimulate the production of at least 400 words in most cases and of 60 consecutive clauses in practically all cases. The addition of more sequences would have meant the prolongation of the test in many cases to about 75 minutes. As it was, the average time for examination with the oral language series, including the practice series, was 27 minutes, with the range from 14 to 92 minutes.

²The following directions were given invariably to every child: "When you look into this show you will see pictures moving. These pictures tell a story, just like in the funny papers. See" (The examiner then unrolls a practice picture sequence so that the pictures are connected). "Now let's go back to the beginning. Tell me all about the story in a loud, clear voice." Following this, the child was permitted to talk about two practice sequences. At the beginning of each new sequence the experimenter said, "Now tell me the story about *these* pictures." In no case did the examiner attempt to stimulate further oral language by asking supplementary questions or by making suggestions.

pictures until he had expended all of his ideas. As soon as the child showed evidence of being finished with these two pictures, the next picture of the sequence was moved into his view. He then talked about this. Thus, after the first two, the subject always saw a picture that he had already talked about and also a new one. This picture procedure of showing the sequences was followed in every case. Two preliminary series were given to accustom the child to the testing situation and to make sure that he understood the directions. During the experiment proper, all of the child's oral language was recorded in shorthand by an experienced stenographer.

Obviously, this method and procedure for obtaining a sample of oral language, had the following advantages: First, it proved to be an excellent method of stimulating a free flow of spontaneous oral language. Second, even the shyest child quickly became immersed in this "game." Most children in talking inserted their heads into the front opening of the apparatus and appeared completely undisturbed by outside stimuli. Because of the fact that children usually became completely absorbed in the pictures and apparatus, the factor of an outside censor such as a teacher or other pupils was eliminated. Third, the material employed to stimulate oral language proved to be of interest to a wide age range, especially from year 8 to 16. Fourth, both the stimulating situation and the type of oral language produced were practical in that they simulated the every day uses which children make of language, such as the telling of stories about moving pictures, picture books, and story books which they have seen or read. This device duplicated these situations.

C. SELECTION OF THE SAMPLE AND DESIGN OF THE EXPERIMENT

Unlike other investigators who had studied groups of children at different grade and mental age levels, we decided to make a comparative study between two groups of subjects widely disparate in mean chronological age but who were equal as far as mental status and other factors were concerned. In obtaining subjects for the experiment, four factors were considered: First we thought it desirable to have two separate groups of mental defectives and as far as possible two separate groups of normal children. In this way, the results obtained with one pair of groups would be a check on the other pair. Secondly, it seemed important to control experimentally the factors of mental age, socio-economic status, and sex. Third, since we planned to sample only small numbers of children within each group, we thought it a good procedure to delimit the chronological and mental age ranges of our

subjects. Fourth, it was necessary to eliminate all subjects who had had previous contact with the materials of our experiment.

Accordingly, one group of 80 mental defectives between the ages of 14 and 16 and the mental age range of 8-6 to 10-5 was selected at random from all of the 11 Minneapolis schools which adolescent mental defectives attended. From this selected group, eight cases were eliminated who had noticeable speech defects and who had had previous practice with the experimental materials. Another group of mentally deficient adolescents, 61 in number, who proved to be the total population falling within our restrictions, were examined at the Minnesota School and Colony, at Faribault, Minnesota, a residential institution for mental defectives (see Table 1). Both groups of

TABLE 1
BASIC DATA CONCERNING TOTAL GROUPS

Matched groups	No of cases	Chronological ages* Range	Mental ages* Mean	Intelligence quotients Range	Mean	Sigma
City defectives I	72	14-0 to 15-11	177.3	8-6 to 10-5	119.6	67.5 4.3
Normal group II	72	8-2 to 10-9	117.8	8-6 to 10-5	119.2	95 to 109 101.2 3.4
Institution defectives III	61	14-0 to 18-11	194.1	8-6 to 10-5	114.5	53 to 74 59.6 4.7
Normal group IV	61	8-2 to 10-10	112.3	8-6 to 10-5	113.8	95 to 109 101.4 4.0

*Range is given in terms of years and months; means are given in terms of months.

mentally defective subjects were then matched with normal children from six different elementary schools in Minneapolis, in regard to mental age, sex, and socio-economic status of the parents. In matching normal children with the two groups of mental defectives, 25 of the normal children, who were used to match the Minneapolis mental defectives, were also used to match the institution defectives.

In order to obtain the *MA* of each subject, the Revised Stanford-Binet; Form *L*, was administered by the senior author to 70 per cent of the mental defectives and to all the normal children, within a week prior to the administration of the oral language test. To the remaining 30 per cent of the mental defectives, the same intelligence test had been administered within a period of two years previous to this experiment by psychometricians from

the Child Guidance Bureau of the Minneapolis public school system. In order to obtain the socio-economic index, the father's occupation was classified according to the Goodenough-Minnesota Scale (8).

Certain techniques and procedures were used in administering the oral language tests. In order to prevent the entrance of any constant error or errors, the order of presenting the picture sequences to each child was randomized. A second factor in our experimental procedure concerned the obtaining of a reliability sample. Since we desired to know if our subjects were consistent in making the same number of errors, a second test using the same material was given. We selected at random 25 children from the normal group and 25 of the Minneapolis mental defectives. To these subjects we again administered the same picture sequences presented in random order to each child. Re-tests on these sequences were conducted from one to seven days after the first presentation of the pictures. The median days between administration of the first test and reliability tests for the mental defectives was 2.4 and the median number of days for the normal children was 2.1.

In order to compare the production of oral errors between our groups of children and to economize in time, we examined each child with the oral language test until he had articulated approximately 60 clauses. Prior to adopting this method as a unit of measurement, we also investigated the possibility of stopping at a point where the child would have articulated 400 consecutive words. Although this would have been a more direct method to employ, we found that some children did not use over 250 words in all of the eight sequences. These were children who, although they were interested in the peep show, talked in very short sentences without expanding any of their simple statements. In all cases of these preliminary trials, however, we found that no matter how meager was the production of oral compositions by some children, we could always count 60 consecutive clauses. For these children who talked only in short and simple sentences it would have been necessary to provide as many as 16 different picture sequences in order that they should produce at least 400 or 450 words. By using the method of counting clauses instead of consecutive words, we found also that most children used at least 400 words per 60 clauses and that some articulated as high as 600 words per 60 clauses. Thus, despite the fact that some children were articulating only 250 words per 60 clauses, we could still hope to get an average word production for any one group of about 400 words per 60 clauses. In this manner, children who talked very little could be in-

TABLE 2

BASIC DATA CONCERNING EACH GROUP AND SUB-GROUP, ANALYZED BY AGES AND SEX

Total** group	Sub-* group	Chronological Cases	Chronological ages***		Mental ages***		Intelligence quotients	
			Mean	Range	Mean	Range	Mean	Range
I	A	8	177.4	168-190	114.1	102-113	64.3	61- 67
II	A	8	114.3	106-117	113.2	102-113	99.0	96-103
III	A	22	194.3	168-227	108.4	102-113	56.2	57- 69
IV	A	22	105.9	99-117	107.5	102-113	101.5	96-109
I	B	14	178.5	169-191	113.2	102-113	63.4	59- 68
II	B	14	115.6	98-118	114.5	102-113	101.2	95-109
III	B	16	186.2	174-224	109.2	102-113	59.2	55- 65
IV	B	16	107.4	98-116	107.7	102-113	100.3	96-104
I	C	16	176.5	168-187	124.6	114-125	70.6	66- 75
II	C	16	121.4	110-129	123.0	114-125	101.3	95-107
III	C	12	197.9	174-218	121.6	114-125	61.4	55- 73
IV	C	12	121.3	104-130	120.9	114-125	99.6	95-103
I	D	34	176.9	169-190	126.7	114-125	71.6	65- 76
II	D	34	119.9	107-125	124.9	114-125	102.9	97-109
III	D	11	194.8	168-218	119.2	114-125	61.2	53- 74
IV	D	11	114.2	106-123	119.6	114-125	104.7	100-109

*Sub-groups: A = Female, MA's from 8-6 to 9-5; B = Male, MA's from 8-6 to 9-5; C = Female, MA's from 9-6 to 10-5; D = Male, MA's from 9-6 to 10-5.

**See Table 1 for explanation of I, II, III, IV

***In each case the ranges and the means are given in terms of months.

cluded in the total sample instead of being discarded because they had produced an inadequate composition.

In choosing this method we expected that there might be some discrepancy in total number of words employed by different groups; that is, that either the normal children or the mental defectives might produce more words in 60 clauses. In that case, we planned to adjust this discrepancy by statistical means so that we could still compare the mean difference in oral errors. The fact that our expectations did not prove to hold true in this latter respect is shown by Table 3. In this table we see that the groups differ very little either in total number of words produced per 60 clauses or in mean number of words. In any comparison between any two groups the mean differences did not prove to be significant. We therefore did not have to adjust the mean oral errors made by any groups.

D. METHOD OF DETECTING CLAUSES AND ORAL ERRORS

Since our unit of measurement was the clause instead of the word, we

TABLE 3
 RANGE OF WORDS AND MEAN WORDS PRODUCED BY EACH GROUP PER SIXTY CONSECUTIVE
 CLAUSES

Total group	Sub-group*	Range of words words produced	Mean words
I	<i>A</i>	302-541	422.13
	<i>B</i>	287-557	419.21
	<i>C</i>	274-536	405.44
	<i>D</i>	365-499	428.55
II	<i>A</i>	279-544	406.00
	<i>B</i>	342-515	428.65
	<i>C</i>	252-592	416.50
	<i>D</i>	302-545	428.74
III	<i>A</i>	324-532	424.45
	<i>B</i>	289-549	418.56
	<i>C</i>	261-567	409.32
	<i>D</i>	298-547	421.65
IV	<i>A</i>	303-502	417.31
	<i>B</i>	293-525	427.42
	<i>C</i>	274-558	416.32
	<i>D</i>	282-578	425.64

*See Table 2 for explanation of *A*, *B*, *C*, *D*.

had to establish simple and definite rules by which more than one observer could detect clauses readily. Our general definition in the detection of clauses was that a clause is any meaningful word or group of words containing a subject and a predicate either present or implied. In order to make this clause selection as objective as possible, we stated various explanations of this definition and gave concrete examples:

1. The commonest example of a clause was a statement such as "the boy is running." Such a statement as "the boy and girl running down the road" was also classed as a clause. However, such a statement as "the boy and girl are . . ." was never classified as a clause, but as an incomprehensible group of words, since the word "are" is only an auxiliary and not the complete verb.

2. In counting clauses, repetitions of clauses or of words were also eliminated from the tabulation. In the statement, "Blondie is running to get Dagwood . . . is running to get Dagwood" the second clause is a repetition of the first and was not counted.

3. In cases where a second remark was a continuation of a first remark and was governed by the same subject, the second remark was never counted as a separate clause. For example, "The boy and girl are running . . . walking down the road" was counted as one clausal expression.

4. When a second remark was not governed by the first subject the second remark was always considered to be another clause. For ex-

ample, "the boy is falling . . . was kicked by the horse." Two clauses were counted here.

5. When words were used by children to express a whole thought, these words, called, "Naming clauses" were counted as whole clauses. This type of expression, usually employed by very young children and accompanied by pointing to the object, appeared infrequently in our protocols. That is, a child pointed to a picture and said, "man." In the example, "And Dagwood called, 'Blondie!'", the word "Blondie" was counted as a clause since it is a short form for, "Blondie, I want you to come here" or "Blondie, where are you?"

6. The main problem in counting clauses concerned the ability to distinguish between true clauses and incomprehensible remarks. These are remarks which could not be classified because of the absence of sufficient word elements. One example in which the noun and the verb auxiliary only were stated has already been given. "The Lone Ranger will . . ." is another example of such a condition.

a. Separate words or combinations of an article and a noun, or a conjunction and an article, were also incomprehensible remarks, when not clearly a naming clause.

b. A participle and an object standing alone without clear reference to the picture or to the statement next preceding, was always incomprehensible. However, when the participle and object followed a statement which these two words explained, then this participle and object were considered as a separate clause. For example, "The boy is falling . . . kicked by a horse."

c. It should be noted that it was not necessary for a clause to contain a subject if the subject was implied or readily understood.

7. Miscellaneous exceptions and examples of what were counted as clauses follow:

a. If two expressions seemed to be governed by the same subject or subjects but if the latter expression referred to a different picture, then the second expression was counted as a separate clause

b. Parenthetical remarks were counted as separate clauses. For example, "And Dagwood, I mean Blondie, took Dagwood into the house," was counted as two clauses.

c. In the expression, "Here is where a girl is riding on a horse," "Here is" was counted as a clause, functionally complete but structurally incomplete.

After rules for counting clauses had been established, both the senior and the junior authors separately counted the clauses and a measure of reliability between these two series of countings was obtained. The Pearson Coefficient of Correlation between our separate countings on the first occasion was $+.95$ and $+.97$ on the second occasion.

In selecting the types of oral errors to be considered we used four major sources for our criteria. First, we repeatedly consulted Mencken (11),

Stratton (17), and Webster's Collegiate Dictionary (18). Secondly, we carefully read most of the major studies which had been made in this area to note the types of errors they had elected to search for. Although we realize that there are many differences of opinion over the classification of some statements as oral grammatical errors, most of the errors in our list are listed by authoritative books such as Stratton and Mencken and by the research studies which have been made in this field. Where authorities differ in regarding a certain expression as a grammatical error, we shall note this.

1. The use of the word "got."
2. The use of "a" for "an."
3. Errors in pronunciation or clearness of speech, such as "gonna" for "going to."
4. Errors in the use of the proper synonym.
5. Incomprehensible expressions.
6. Repetitions.
7. Provincialisms and colloquialisms.

In Table 4 are listed all of the grammatical errors which we found in this study. The reader will note that they are first classified under seven large categories, according to part of speech, and following this, each of the larger headings is analyzed in a more specific manner. In this way we detected 42 separate errors in the oral compositions of our groups of children.

To simply establish a grammatical classification of oral errors, does not mean that this classification is of itself an objective and reliable one. First, the classifier must give specific examples of the manner in which one could identify those oral errors and secondly, he must experiment to see whether they can be identified reliably by at least two different observers. In the preceding discussion we have attempted to make the identity of these errors as objective as possible by giving specific rules and examples. In order to determine whether two different observers could pick out the same number of oral errors on two different occasions, the senior and junior authors applied the system which we established to a randomly selected group of 100 of our total subjects. On the first occasion the coefficient of correlation between the selections made by the two scorers, was $+ .92$ with a t of 23.6 and on the second occasion this was $+ .94$ with a t of 21.1. We feel therefore, that this system is objective and reliable enough so that other people using our rules can hope to get identical results.

TABLE 4

LIST OF ORAL ERRORS MADE BY 133 MENTAL DEFECTIVES AND 108 NORMAL CHILDREN

1. <i>Errors in use of verb or verb parts</i>	
Type of error	Examples
1. Failure of verb to agree with subject in number or person	Baby Dumpling and Dagwood is walking.
2. Wrong verb	The dog don't like the idea. Blondie and Dagwood are laying in bed.
3. Wrong form of verb	Lone Ranger is got the crook. The boy that got drowned.
4. Confusion in tenses of verb.	And he brang (brought) it. The mouse trap must a went off.
5. "t" ending on verbs	It hasn't came out yet. holt (for hold) wisht (for wish) scairt (for scared)
6. Omission of predicate	And then he hit right in the eye by the ball.
7. Omission of auxiliary	And Dagwood giving Blondie a taste of it.
8. Use of ain't	It ain't no good.
9. Incorrect use of mood	As if he was trying to help him.
II. <i>Errors in use of pronoun</i>	
10. Wrong form of personal pronoun	Baby Dumpling got hisself all full of jelly.
11. Wrong form of relative pronoun	The girl what had a hurt leg.
12. Relative pronoun not in agreement with modifier	Dagwood is telling that lady about the dice.
13. Omission of relative pronoun	There's a crook sees the mail wagon.
14. Non-agreement of pronouns	And that guy was up to bat hit him. Blondie ask Dagwood to tell him go downstairs to get a drink a water.
III. <i>Errors in use of nouns</i>	
15. Wrong form of noun	And Blondie's grabbed one of his foot.
16. Subject of verb not in nominative case	He's after the other mens. Some other man and him attack the stage coach
17. Subject omitted	Came into the room. Hit the ball.
IV. <i>Errors in use of prepositions and conjunctions</i>	
18. Confusion of preposition and conjunction	Looks like he's in a hurry to go some place. The dog sitting in the corner like something the matter with him.
19. Wrong preposition	Dagwood got hit from the pitcher. Daisy is playing for Baby. Dumpling won't fall off there.
20. Omission of preposition of conjunction	He tells them drop their guns. A wagon which riders go to place to place.
21. Use of conjunction instead of preposition "to" in infinitives	Now the man is coming over the hill and see if he can see somebody.
22. Use of the expression "offen"	He jerked the man offen his horse The girl is pull a sock offen the boy. If it wasn't for them he wouldn't of been saved.

TABLE 4 (*continued*)

Type of error	Examples
<i>V. Syntactical redundancy</i>	
24. Double subject	Blondie she gets a wet cloth.
25. Emphatic repetition of subject and predicate at end of sentence	And then her horse finally gets away from her it does.
26. Redundant final "s"	Along ways. . . .
27. Redundant initial "a"	She was ascared.
28. Unnecessary preposition or conjunction	She looks scared like Knocks out his gun out of his hand.
29. That there, this here, these here, those here	This here fat guy, he hit a ball.
30. General Redundance	A man goes to run around the base. Then when he went to come on to first base. And Dagwood made Blondie to taste what he made
<i>VI. Errors in use of adverbs and adjectives</i>	
31. Confusion of adjective and adverb	He's pretty near got him down on the ground.
32. Wrong form of adjective	She didn't succeed very good. They got a life save belt. The jar is broke.
33. Confusion of demonstrative adjectives and personal pronouns	Them two boys are playing baseball.
34. Misuse of construction "sort of" and "kind of"	She's looking sort of queer. The man is kind of like kneeling.
<i>VII. Miscellaneous</i>	
35. Subject and predicate or subject and auxiliary omitted	In the morning time to get up. Putting a wet towel over his head.
36. Transposition of words	Dagwood is showing Blondie it. And then comes a boy and the mother out.
37. Transposition of clauses	And he's dumping something else in the garbage can that he's making. And then Dagwood is tossing some stuff in the garbage can with an apron on.
38. Formation of wrong conception of true word	He looks exgusted (disgusted). The horse's range (reins).
39. Double (or triple) negative	You can't go out and play no more today. So they won't have no bother with him no more (triple negative).
40. Omission of definite article	And Dagwood gets mousetrap and puts cheese in mousetray.
41. Object of verb not in objective case	And here it shows they carrying. . . . And this man who he caught. . . .
42. Wrong use of word	A bunch of noise. . . He's eating a bunch of popcorn.

E. RESULTS OF THE EXPERIMENT

Before beginning a discussion of the differences and similarities between our groups, we necessarily had to settle some basic questions: How consistent

were our subjects in making oral errors? Was there a relationship between the number of oral errors made by children in the first part of the oral examination and in the second part? Did subjects retain their relative status in number of oral errors made on a second test? Answers to these questions, we felt, would give us information concerning the reliability of our instrument. Thus, when we correlated the number of oral errors which each of our four major groups made in the first 30 clauses with the number of errors that they made in the second 30 clauses, we found that the size of Pearson coefficients of correlation ranged from $+.78$ to $+.86$.

Rank-difference correlations were also computed for 25 normal subjects and for 25 Minneapolis mental defectives selected at random from our total groups of subjects. We were interested in knowing the relationship between the number of oral errors which each group made on a first test using 60 clauses as the unit of measurement and a second test administered between two and seven days after the first test. For the 25 Minneapolis mental defectives the rank difference correlation was $+.72$ after being corrected for attenuation. For the normal children the correlation was $+.67$ when corrected for attenuation. If one now considers the fact that the picture sequences were randomized for each child, these coefficients of correlation which were obtained should probably be regarded as sufficient evidence of high reliability. The reliability of our procedure in measuring oral language is also substantiated by two additional facts: First, the mean differences between the oral errors in the first and second 30 clauses proved to

TABLE 5
MEAN ORAL ERRORS PER SUBJECT MADE BY EACH GROUP AND SUB-GROUP IN FIRST 30 CLAUSES, SECOND 30 CLAUSES, AND TOTAL 60 CLAUSES

Group*	Clauses	<i>Sub-groups in terms of MA</i>							
		A	B	C	D	Total	A+B	C+D	A+C B+D
I	1st 30	3.12	3.21	2.02	3.62	3.29	2.98	3.47	2.62 3.52
	2nd 30	2.63	3.15	2.54	4.06	3.22	3.16	3.21	2.34 3.77
	Total 60	5.75	6.36	4.56	7.68	6.51	6.14	6.68	4.96 7.29
II	1st 30	2.24	1.98	2.14	2.20	2.17	1.73	1.95	2.21 2.08
	2nd 30	2.64	1.38	1.99	2.09	1.97	2.18	2.29	2.17 1.94
	Total 60	4.88	3.36	4.13	4.29	4.14	3.91	4.24	4.38 4.02
III	1st 30	4.23	3.84	2.85	5.02	4.01	4.01	3.81	3.43 4.06
	2nd 30	4.50	3.47	2.98	4.71	3.96	4.12	3.89	3.16 4.24
	Total 60	8.73	7.31	5.83	9.73	7.97	8.13	7.70	6.59 8.30
IV	1st 30	2.92	2.70	3.02	2.00	2.61	2.82	2.41	2.34 2.29
	2nd 30	2.81	2.43	2.81	2.09	2.85	2.65	2.59	2.42 2.41
	Total 60	5.73	5.13	5.83	4.09	5.46	5.47	5.00	5.76 4.70

*For explanation of groups and sub-groups see Tables 1 and 2.

be statistically insignificant for any one sub-group (Table 5). Second, when the mean oral errors made by two groups on two separate occasions are compared (Table 6), one finds that the mean differences between scores on

TABLE 6
MEAN ORAL ERRORS PER SUBJECT MADE BY TWO GROUPS ON TWO SEPARATE OCCASIONS

Group	No. of cases	First oral language test			Second oral language test		
		1st 30*	2nd 30*	Total 60*	1st 30	2nd 30*	Total 60*
City mental defectives	25	3.63	2.72	6.35	3.08	3.51	6.59
Normal children	25	1.85	2.32	4.17	2.15	2.60	4.75

*This indicates the first 30 clauses, second 30 clauses, and total 60 clauses.

first and second tests (the first 60 clauses in each case) are also insignificant. Basing our judgment on these factors of reliability, we feel sure that our present methods could be made the basis for the standardization of a test which would seek to measure oral language errors of school children. This, however, is a task not contemplated by this present research.

It will be remembered that normal children were matched with mentally directive adolescents in regard to three characteristics. Our main purpose in doing this was to note what effect *CA* had in the production of oral errors when *MA*, sex, and socio-economic status were controlled. Our first findings, therefore, will deal with the differences which we found to exist between matched groups. These differences will be discussed from both a qualitative and quantitative standpoint. Within this category we have collated information regarding the differences in mean oral errors between the total matched groups and then between matched sub-groups divided according to age and sex. Not only were we interested in the quantitative differences, but we also have noted differences in the kinds and types of errors made by our matched groups.

Secondly, an analysis was made of the differences in mean oral errors and in kinds of errors occurring within each of the major Groups I, II, III, and IV. We attempted to find answers to such questions as: Did older subjects, within any one major group, make more or less errors than younger subjects? Did male subjects make more or less errors than female subjects? Did any differences exist in the kinds of errors made by older or younger subjects? Thirdly, we were interested in knowing what differences existed between unmatched groups of our subjects. We therefore made an analysis to determine what qualitative and quantitative differences existed between our two mentally defective groups.

1. *Quantitative Differences and Similarities between Matched Groups*

In testing the significance of differences between our matched groups and between our groups which were distinct and in which the variates were not paired, we employed the statistical techniques detailed by Goulden (9). For the present study, we have accepted a P of .02 or less than .02 as insuring our results of being statistically significant. Proceeding under this plan, we first tested for significance the difference between the means of total Group I and total Group II (Table 7). We found that the difference of

TABLE 7
SIGNIFICANCE OF DIFFERENCES IN MEAN ORAL ERRORS BETWEEN GROUPS AND SUB-GROUPS

Sub-group*	Differences between paired groups					
	Mean diff.	Group I-Group II " t "** test	P **	Mean diff.	Group III-Group IV " t "** test	P **
<i>A</i>	+0.87	0.62	$>.05$ 15 <i>df</i>	+3.00	1.38	$>.10 < .20$ 21 <i>df</i>
<i>B</i>	+3.00	2.34	$<.05 > .02$ 13 <i>df</i>	+2.18	1.10	$> .20 < .30$ 15 <i>df</i>
<i>D</i>	+3.39	3.00	$<.01$ 33 <i>df</i>	+5.64	3.15	$>.01 < .02$ 10 <i>df</i>
<i>A+B</i>	+2.23	2.48	$<.05 > .02$ 21 <i>df</i>	+2.66	1.84	$>.05 < .10$ 37 <i>df</i>
<i>B+D</i>	+3.27	3.75	$<.01$ 47 <i>df</i>	+3.60	2.59	$>.01 < .02$ 26 <i>df</i>
<i>C+D</i>	+2.44	2.78	$<.01$ 49 <i>df</i>	+2.70	2.16	$>.01 < .02$ 22 <i>df</i>
<i>A+B+C+D</i>	+2.37	3.42	$<.01$ 71 <i>df</i>	+2.51	2.49	$>.01 < .02$ 60 <i>df</i>

*In Sub-Group *C* the mean differences in each comparison were insignificant; thus, I — II = +0.43 and III — IV = 0.00. See Table 2 for explanation of *A*, *B*, *C*, *D*.

**" t " refers to the Fisher t test for differences between means.

P refers to the probability for the occurrence of a mean difference between any two groups; *df* has reference to the degrees of freedom.

2.37 was significant at the 1 per cent level. A test of the difference between the means of total Groups III and IV, revealed that the difference of 2.51 was also significant.

In comparing matched sub-groups and combinations of matched sub-groups we found that both the Minneapolis and institution mental defectives differed significantly from the normal children in the *D*, the *C + D*, and in the *B + D* sub-groups (Table 7). Interestingly enough, both the

D and $B + D$ sub-groups included only boys, while the $C + D$ included both boys and girls. It is here that we receive the first indication of sex differences in the production of oral errors.

It will be remembered that the major purpose of selecting Groups III and IV was to provide a duplicate sample in order to verify the results which we obtained with matched Groups I and II. The fact that we also obtained significant differences between total Groups III and IV and between D , $C + D$, and $B + D$, in the comparison between institution defectives and normal children, adequately substantiates the significant differences obtained between identical groups in the I and II comparison.

Despite the fact that significant differences appeared only in four instances in comparing Groups I and II or Groups III and IV, one should note, however, that the mentally defective subjects consistently make more mean oral errors than the normal children. In all eight instances in which the sub-groups of Minneapolis mental defectives are compared with the sub-groups of normal children and in seven out of eight instances in which sub-groups of institution defectives are compared with their matched groups of children, differences are always positive in the direction of the mental defectives.

2. *Qualitative Comparison between Matched Groups*

Although mental defectives differed markedly from a quantitative standpoint, it is interesting to determine how these two distinct populations compared from a qualitative standpoint. Did mental defectives make the same type of oral errors as normal children who were matched with them in regard to *MA*, sex, and socio-economic status, or were there certain pronounced differences? Did mental defectives make oral errors which were never made by normal subjects?

In Table 8 we have listed the 10 highest ranking errors made by each of Groups I, II, III and IV. In the case of each group, these 10 highest ranking errors represent much the greater proportion of total errors made by any specific group. Thus, the 10 highest ranking types of errors made by Group I represent 82 per cent of the total number of errors made by the group. This condition is repeated for Groups II, III, and IV. When we consider that the different kinds of errors made by each group ranged from 29 to 38, we immediately realize how important these 10 highest ranking errors are for each group from a relative standpoint. These are the errors, then, which merit the most discussion and the most attention by teachers and investigators in the field.

At least two additional facts should be noted from Table 8. While error

TABLE 8
HIGHEST TEN RANKING ERROR TYPES MADE BY EACH GROUP; IN TERMS OF PER CENT
OF TOTAL ERRORS

Rank	Group I**		Group II		Group III		Group IV	
	Error* type	% of total errors	Error* type	% of total errors	Error* type	% of total errors	Error* type	% of total errors
1	1	23.5	24	31.0	1	15.7	24	30.7
2	7	15.1	1	13.9	24	14.4	1	15.5
3	18	14.9	2	7.3	7	9.5	7	13.6
4	24	10.9	31	6.6	18	9.3	2	6.8
5	4	4.6	18	5.6	17	5.8	34	3.4
6	20	3.4	34	5.0	34	4.9	31	3.1
7	2	2.9	3	3.3	35	4.5	4	2.8
8	34	2.7	28	2.6	2	3.7	3	2.5
9	28	2.3	30	2.6	6	3.5	17	1.9
10	31	1.7	8	2.3	28	3.3	30	1.6
Total per cent		82.0			80.2		74.6	
							81.9	

*Table 4 lists all error types in full detail.

**See Table 1 for an explanation of I, II, III, IV.

No. 1, the failure of verbs to agree with their subjects in number or person, is the most prevalent single error made by Group I, error No. 24, the use of a double subject, is the most frequent error made by Group II, the normal children. That this seems to be a stable difference is substantiated by the Groups III and IV comparison. Here too, we find error No. 1 being made most frequently by Group III and error No. 24 being made most frequently by Group IV.

Despite the fact that we find only few exact agreements in rankings between groups, one should note that 7 out of the 10 highest ranking errors made by Group I are also made by Group II. Likewise, 7 of the 10 errors made by Group III are also made by Group IV. In addition, all groups made four errors in common (Table 8). These are: 1, 2, 24, and 34. Error No. 2 is the use of a wrong verb, such as, "The life guards are got Dagwood." Error No. 34 refers to the misuse of the construction, "sort of" or "kind of," for example, "She is looking sort of queer." Finally, it is important to note the seven errors which were made by both groups of mental defectives combined but which were never made by any of the normal subjects. Of these seven errors, mental defectives erred most frequently on Nos. 11, 25, and 40 less frequently on 12, 22, 32, and 38.

We have made an additional analysis of the errors made by each group in terms of the grammatical category in which these errors fall. According to Table 4, seven such categories are listed: the first being errors in the use

of verb or verb parts, the second, errors in the use of the pronoun, and so on. In comparing Group I and Group II (see Table 9), we note first that much

TABLE 9
PERCENTAGE OF ERRORS** WHICH MAY BE ALLOCATED TO EACH GRAMMATICAL CATEGORY;
PERCENTAGES LISTED FOR GROUPS AND CERTAIN SUB-GROUPS

G. C.*	Group I					Group II				
	A+B	C+D	A+C	B+D	Total	A+B	C+D	A+C	B+D	Total
1	54.8	45.5	54.8	46.3	48.6	38.3	30.2	32.4	32.6	32.3
2	3.7	1.5	0.8	2.6	2.1	4.6	1.9	2.9	2.6	2.7
3	0.8	2.7	0.8	2.6	2.1	2.3	2.8	1.9	3.1	2.7
4	19.2	20.6	11.8	23.2	20.3	7.0	6.6	7.6	6.2	6.7
5	11.1	20.6	20.2	17.2	17.9	37.1	40.1	44.7	37.3	39.6
6	6.7	4.2	7.5	4.0	4.8	8.1	14.6	6.7	16.1	12.7
7	3.7	4.5	4.2	4.2	4.2	2.3	2.8	3.8	2.1	2.7

G. C.*	Group III					Group IV				
	A+B	C+D	A+C	B+D	Total	A+B	C+D	A+C	B+D	Total
1	43.4	29.3	42.4	33.4	38.3	46.6	37.4	44.4	40.9	43.0
2	1.6	4.5	2.7	2.7	2.7	2.9	0.9	1.5	3.1	2.2
3	5.5	9.6	6.1	8.0	7.0	3.4	2.6	1.0	7.1	3.4
4	14.6	6.8	15.2	7.6	10.9	3.4	4.3	2.6	5.5	3.7
5	24.3	30.5	22.2	31.7	26.6	35.1	40.9	44.9	25.2	37.1
6	5.8	8.5	5.3	8.5	6.8	6.2	8.7	3.6	12.6	7.1
7	4.8	10.7	6.1	8.0	7.0	2.4	5.2	2.0	5.5	3.4

*Grammatical categories: 1 = Errors in use of verb or verb parts; 2 = Errors in use of pronouns; 3 = Errors in use of nouns; 4 = Errors in use of prepositions and conjunctions; 5 = Syntactical redundancy; 6 = Errors in use of adverbs and adjectives; 7 = Miscellaneous.

**Percentages were calculated as follows: Total errors falling within all categories were divided by number of errors falling within each category for each sub-group. For example,

$$\text{Per cent of errors in } A+B \text{ (Category 1)} = \frac{\text{No. of errors in } A+B \text{ (Category 1)}}{\text{Total errors in } A+B \text{ (Category 1-7)}}$$

the greater proportion of errors made are segregated to three categories. Thus, Group I makes almost 50 per cent of its errors in connection with Category 1, errors in the use of verb or verb parts.³ When Categories 1, 4, and 5 are considered together, 86.8 per cent of the errors made by Group I can be listed in this combination. For Group II on the other hand, grammatical category No. 5 ranks first. For this group, Categories 1, 5, and 6 account for 84.6 per cent of the total errors.

When Groups III and IV are compared, we note that the same combination of categories, Nos. 1, 4, and 5 for Group III and Nos. 1, 5, and 6 for Group IV will contain the greatest proportion of errors. For Group IV, however, Category 1 now assumes the first position and Category 5 assumes

³Certain specific error types account for most of the oral errors within any particular category. Thus, in Category 1 error Types 1, 2, 4, and 7 accounted for most of the errors made by Group I.

second position. From Table 9 it is also clear that the normal subjects proportionately make more errors than the mentally retarded in Category 5, while the mentally retarded make more than normal children in Category 4. Both comparisons of Groups I and II and III and IV agree on this. A thorough inspection of Table 9 also shows that the sub-groups in practically all cases maintain the same relationships in the proportion of errors placed in each category as do the total groups.

3. *Comparison between Mental Age Groups in Production of Oral Errors*

Since we selected two distinct mental age groups, one group ranging from 8-6 to 9-5 and the other from 9-6 to 10-5, we were able to compare the older sub-groups *C*, *D*, *C + D*, with the younger sub-groups, *A*, *B*, *A + B*. Although we could not find any mean differences between older and younger sub-groups which were significant, we noted certain definite tendencies. According to Tables 5 and 7, mentally retarded females with the lower *MA*'s, whether in Group I or Group III, always made more mean oral errors than the higher *MA* groups of mentally retarded females. Conversely, the higher *MA* groups of mentally retarded males also made a greater mean number of errors than the lower *MA* group of mentally retarded males. While Group II exactly follows this pattern, Group IV does not follow the pattern and therefore differs in this respect from Group III. In the same way, Sub-Group *C + D* scored a greater number of oral errors than Sub-Group *A + B* within every group with the exception of Group IV.

It was also interesting to note mental age differences in connection with Table 9. An analysis of this table shows that in each sample *A + B* makes a greater proportion of its total errors than *C + D* in grammatical category No. 1. This would mean then, that lower mental age groups, whether normal or mentally retarded, will err more often in the use of the verb or verb parts than will the higher mental age groups. Second, within the normal groups only, *A + B* will make a greater proportion of its total errors than *C + D* in grammatical Category 2 which deals with errors in the use of the pronoun. The mentally retarded groups do not adhere to this pattern. Third, within all samples Sub-Group *C + D* makes a greater proportion of its errors than *A + B* in category No. 5. According to this then, our subjects with higher mental ages will make more errors in syntactical redundancy than will subjects with lower mental ages whether normal or mentally retarded. Fourth, within Groups II and IV only, *C + D* will consistently make a greater proportion of its errors than *A + B* in gram-

matical Categories 6 and 7, errors in the use of adverbs and adjectives and miscellaneous.

More specific differences between the mental age groups are also evident. After comparing mistakes which each sub-group made in single error types with the total number of mistakes made on all error types,⁴ we were able to say that subjects with lower mental ages (8-6 to 9-5) proportionately employ error type No. 7 more often than do subjects with higher mental ages (9-6 to 10-5). This occurs within every major group. In these cases $(A + B) - (C + D)$ showed the following differences in percentages: For Group I, $17.0 - 14.4 = 2.6$; Group II, $2.3 - 1.4 = 0.9$; Group III, $13.9 - 1.7 = 12.2$; Group IV, $20.7 - 0.9 = 19.8$. Within Groups I and II and Groups I and III subjects with lower mental ages also employ error type No. 1 more often. For these $(A + B) - (C + D)$ is as follows: Group I, $27.4 - 19.2 = 8.2$; Group II, $20.4 - 11.8 = 8.6$; Group III, $17.5 - 12.4 = 5.1$.

On the other hand, subjects with higher mental ages proportionately employ error Type 34, with respect to all groups, and error Type 24, with respect to I, II, and IV, more often than do subjects with lower mental ages. With regard to No. 34 the percentages for $(C + D) - (A + B)$ are as follows: I, $7.4 - 3.6 = 3.8$; II, $6.6 - 1.2 = 5.4$; III, $7.3 - 3.6 = 3.7$; IV, $7.0 - 1.4 = 5.6$. With respect to No. 24 the percentages for $(C + D) - (A + B)$ are: I, $12.6 - 6.7 = 5.9$; II, $32.4 - 30.0 = 2.4$; IV, $38.3 - 26.4 = 11.9$.

4. *Differences and Similarities between Sexes in Production of Oral Errors*

On a preceding page we have brought out the fact that mentally retarded boys rather than girls differed significantly from matched groups of normal children in the mean number of oral errors they produced. Since each one of our large Groups I, II, III and IV, was composed of both boys and girls, we were interested to learn the similarities and differences which existed between the sexes within each large group. Upon making such an analysis we found certain significant and consistent differences between the

⁴For example, Sub-Group I ($A + B$) makes 37 mistakes on error Type 1. Since the total number of mistakes for Sub-Group I ($A + B$) in all error types is 135, the

relationship $\frac{37}{135} = 27.4$ per cent, represents a proportion which may be directly compared with an identical proportion obtained for Sub-Group I ($C + D$):

$$\frac{\text{Mistakes in error type}}{\text{Mistakes in all error types}} = \frac{64}{334} = 19.2 \text{ per cent.}$$

sexes. Within both Group I and Group II, the males made a greater mean number of oral errors than the females at the 9-6 to 10-5 *MA* level. ($D - C$ for Group I = 3.12 and $P > .01 < .02$; $D - C$ for Group III = 3.90 and $P > .01 < .02$.) In each case the differences were significant at the 2 per cent level (Table 5). In the same manner, within Group I and III, the combined group of males, $B + D$, made a greater mean number of oral errors than the $A + C$ group of females. The differences here were, however, not significant ones.

An inspection of the data which concerns our normal groups of subjects showed opposite differences, however. Within both Groups II and IV, the females at the 8-6 to 9-5 level and at the combined levels $A + C$ made more mean oral errors than the corresponding groups of males. Despite the fact that these differences were consistent, they were in no case significant. From this data it appears then that among the mentally defective subjects the males consistently, and in two comparisons significantly, made more oral errors than the females. On the other hand, among the normal subjects the girls tended to make more errors than the boys.

More specifically, we were interested to learn in what way the sexes, within each group, differed in regard to the types and kinds of errors which they made. In Table 9 we have divided all errors made into seven different large categories. An analysis of this table reveals these data: First, that within all the large Groups I, II, III, and IV, the males proportionately err more often than the females in Category, errors in the use of the noun. Second, that only within the groups of mental defectives, I and III, the females, more often than the males, err in Category 1, errors in the use of the verb and verb parts. Third, within both groups of normal subjects only, the females err more often in Category 5, syntactical redundancy; and the males err more often than the females in Category 6, errors in the use of the adverb and adjective.

Finally, in what way did our combined males compare with our combined females in regard to the relative frequency with which they made the commonest errors (Table 8)? Our analysis of this question revealed that within all groups, I, II, III, and IV, the males more often than the females made the specific error No. 34. This error concerned the use of the construction "sort of" and "kind of." Within the normal groups only, the boys more frequently than the girls made Errors 1 and 18 and the girls more frequently made Errors 4 and 20. Within both groups of mental defectives the boys more frequently than the girls made errors 2, 4, 20, and 24.

5. *Comparison between Institution and Non-Institution Mental Defectives*

In a few instances, we have already called attention to similarities and differences between Groups II and IV and Groups I and III. We felt, however, that a separate comparison should be made between Groups I and III, our two distinct samples of mental defectives, because each sample had been drawn from a different environment. In contrast to Group I, all of whose subjects resided in a family situation in the city of Minneapolis, Group III resided in an institution for mental defectives. Most of the cases in Group III had resided in the institution for many months. In fact, the mean period of residence for Group $A + B$ combined was 56 months and for Group $C + D$ combined it was 45 months. The range of the periods of residence for all mental defectives in Group III, was from 9 to 189 months. Because most of our cases in Group III had resided in the institution for such a long period of time, we desired to know what effect, if any, institution residence would have on the mental defectives' use of oral language. Although the mean *MA* for Group I is approximately five months higher than for Group III, all subjects in each group fall between the mental age ranges 8-6 and 10-5. In addition the mean *IQ* of Group III is separated only from the mean *IQ* of Group I by approximately eight points (Table 1). Our groups are therefore similar enough so that we can compare them in order to note oral errors.

Our first approach in comparing Groups I and III was to test the differences between the mean oral errors made by comparable Sub-Groups *A*, *B*, etc. In no case did the differences between the means of these comparable sub-groups and of the total Groups I and III prove to be significant. In spite of this, one very definite tendency is noticeable. In every comparison between like sub-groups of I and III and between total groups, the subgroup means and total group mean are higher for Group III than for Group I. Institution mental defectives, then, consistently make a higher mean number of errors than mental defectives residing in a city community.

In spite of the fact that Groups I and III were not matched for either mental age, sex, or socio-economic status, their oral error production was similar in many respects. According to Table 9, each group's errors were distributed in a similar fashion in seven out of the ten grammatical categories. Thus, Category 1 ranks highest for both groups in error production while Category 2 ranks lowest. In only Categories 1 and 4 did Group I make a greater percentage of errors than Group III. In the case of Category 1 the difference in percentages was 10.3 and in Category 4, the difference was 9.4. On the other hand, Group III made a higher proportion of

errors in Category 5 than did Group I. The difference here was 8.7. Institution defectives, then, make more frequent errors than city defectives in syntactical redundancy. Group I, however, errs disproportionately in the use of the verb and in the use of prepositions and conjunctions.

The two groups of mental defectives are similar even in the specific kind of oral errors which they make. For example, according to Table 8, Error 1 has first ranking for both Groups I and III. In fact, the four most common oral errors made by Group I were also made by Group III. These were:

1. Errors in the use of the verb or verb parts.
2. Errors in the omission of the auxiliary.
3. Errors in which the preposition and conjunction are confused.
4. Errors in the use of the double subject

Seven of the first 10 most frequently occurring oral errors by Group I were also made by Group III. Among the 10 most frequent oral errors made by Group I were Errors 4, 20, and 31. These errors, although they were sometimes made by Group III, were not ranked among the 10 most frequent for Group III. Errors 6, 17, and 35 ranked among the 10 most frequent for the latter group but not for Group I.

F. COMPARISON OF THIS WORK WITH OTHER RESEARCH STUDIES IN ORAL ERRORS

It will be remembered that our main goal was to compare the oral errors made by normal, elementary school children, with those made by mental defectives. In searching the research literature in this field we were, unfortunately, unable to find studies which had our specific purpose in mind. As far as we were able to ascertain, all research workers dealing with the general subject of oral errors have sought to determine only the errors made by elementary school children at various grade levels. However, since we, too, had examined two normal groups of children at the fourth and fifth grade levels, we were able to compare a section of our results with the results of previous experimenters.

Errors in oral English have never received a standardized classification. To a certain extent such a procedure would not prove practical, for some expressions which 10 years ago were considered only colloquialisms, are today mentioned as good English in our best grammars, and many are in a state of flux. Because of this aspect of continual change in English usage and because each experimenter takes the privilege of setting up a new and different classification of oral English errors, it is extremely difficult to make legitimate comparison between studies. Even if 10 experimenters set up a

category such as "syntactical redundancy," each will include different specific errors under the classification. The fact that individual specific errors which are included are not too well defined adds only to the confusion.

With these qualifications in mind we have proceeded to make various comparisons. In order to do this we have first reclassified the specific errors listed by Charters and Miller (3), Fillers (6), Siers and Diebel (14), Starch (16), Davis (4), and Goltry (7) so that most errors would fall within any of our seven main oral error classifications (Tables 4 and 9). When this was accomplished (Table 10) certain tendencies could immedi-

TABLE 10
SEVEN STUDIES IN REGARD TO PER CENT OF TOTAL ERRORS THAT CAN BE ALLOCATED TO
SEVEN DIFFERENT GRAMMATICAL CATEGORIES

G. C.*	Charters and Miller	Fillers	Siers and Diebel	Starch	Davis	Goltry	Carlton** and Carlton
1	57.0	58.0	58.0	52.0	51.2	29.0	37.7
2	5.0	7.0	8.0	8.2	4.4	5.4	2.5
3	6.0	3.0	1.0	3.3	3.9	0.0	3.2
4	0.0	0.0	1.0	0.0	3.7	2.0	5.2
5	10.0	10.0	11.0	16.6	15.5	34.1	38.4
6	6.5	4.0	5.0	2.4	3.7	20.5	9.9
7	15.5	18.0	16.0	17.5	17.2	9.0	3.1
(D. N.)**	(11.0)	(14.0)	(12.0)	(10.3)	(2.6)	(0.4)	(0.0)

*See Table 9 for explanation of G. C. (Grammatical Category).

**These represent average per cents for our two normal groups combined. For separate per cents see Table 9.

***Here we learn what per cent of total errors could be classified under D. N. (Double negative) which is a specific error type under Category 7.

ately be noted.⁵ Thus, of the seven grammatical categories, the "verb or verb parts" ranks first as a source of oral error in six out of seven comparisons. Only the Goltry study and this study (Group II) place the "syntactical redundancy" category before "verb and verb parts." When these two categories are considered together, we note that in each study at least

⁵In making these comparisons one should remember that authors differed in their methods of gathering data. Charters and Miller, Fillers, Siers and Diebel, and Starch relied on teachers to note all oral errors that elementary school children, Grades 3 to 8, used in the classroom within a definite period of time. On the other hand, Davis personally examined children at the 5½-, 6½-, and 9½-year age levels. After writing down all of their oral language within a certain few minutes of time, she was then able to search her protocols for oral errors at a later date. Goltry's method differed from the other methods in that his 76 children in Grades 4 through 6 gave prepared reports on biographical, historical, and other topics. Their oral language was mechanically recorded and then analyzed at a later date by the author.

60 per cent of all oral errors may be classified under "syntactical redundancy" or "verb and verb parts."

The fact that we have classified more oral errors under "syntactical redundancy" than have the earlier studies simply means that we have analyzed this category to a greater degree and have placed some specific errors containing verbs or verb parts under this classification. It is interesting to note that as much as 20.5 per cent of oral errors occurring in the Goltry study may be placed under adverbs and adjectives. This is in direct contrast with the lower percentages obtained by all other experimenters for this category. Finally, it is significant that in every study in Table 10, only 13 per cent or less of the total number of grammatical errors may in each case be classified under a combined heading of prepositions, conjunctions, nouns, and pronouns. Since this fact appears in all previous experiments as well as ours, we do not hesitate to emphasize its practical significance. In teaching English grammar to elementary school children, teachers should benefit by research in this field and spend more of their time preventing the occurrence of oral errors in the verb, verb parts, and syntactical redundancy categories rather than in the noun, pronoun, preposition, and conjunction classifications.

In spite of the fact that each author has classified oral errors in a different manner, it is still possible to make comparisons of the incidence of specific oral errors. To a certain extent each experimenter has used identical phrases or sentences to describe specific errors; and it is to this extent that we can begin to make legitimate comparisons. Accordingly, we note the following specific oral errors which are described and discussed by us and by the authors we have studied.

1. *A Verb Fails to Agree with the Subject in Number or Person*

Without doubt this is one of the most frequently occurring errors in the speech of elementary school children. Although it ranks only fourth for the Fillers (6) and Starch (16) samples and fifth for the Siers and Diebel (14) group, this error ranks first for the Goltry (7), Davis (4) and for both of our groups of mental defectives. For Charters and Miller (3) and for both of our groups of normal subjects it takes second ranking.

2. *A Wrong Verb Is Used*

For example, "Blondie and Dagwood are *laying* in bed"; or "Can we stay?" We mention this with the caution that for some writers this classification includes category "Wrong form of the verb." To us the latter classifi-

cation means that the child has invented a new verb such as "brang" for *brought* while the former signifies that the child has used a word in common use in an incorrect manner.

The use of a wrong verb is of primary importance to all researchers. While Siers and Dieble, Starch and Fillers rank it second in occurrence, Charters and Miller rank it third. Instead of listing all uses of the wrong verb under one category, Davis has tabulated specific examples such as the use of "got" for "have," "lay" for "lie." These two tabulations make up 14.9 per cent of her total errors. While for Goltry this category takes sixth rank, for our samples of normal children it takes third and fourth rank and for our mental defectives seventh and eighth place. This latter result may be a good indication that chronological age and improvement in using verbs correctly are related to a sizeable degree. In spite of the fact that both our samples of mental defectives and normal children were drawn from the lowest socio-economic groups, for our mental defectives this usage of the wrong verb does not represent as important a category as it does for our normal children.

The use of the word "ain't" is analyzed separately by us as well as by Davis. Since Fillers, Siers and Diebel, Starch, and Charters and Miller very probably included the use of "ain't" under the use of the wrong verb the rankings which they obtained are necessarily higher than ours. In a separate paragraph Sears and Diebel state that the use of "ain't" for am not, isn't, or aren't was third in the frequency of a still more specific classification of errors. For the Davis sample, the use of "ain't" represented 4.6 per cent of all oral errors. In contrast to these results our groups made only occasional use of the word "ain't." While our groups of mental defectives used it only sparingly, it was still tenth in importance for Group II of our normal children. Whether this means that the use of "ain't" by elementary school children is declining in importance, must be verified by further experimentation.

3. *Children Become Confused in the Use of Tenses*

This category includes not only the use of the wrong tense form but also the use of the present tense for the past, and vice versa, the confusion of past tense and past participle, and the shift of tense in a sentence. For Charters-Miller, Fillers, Siers and Diebel, and Starch, this classification is without exception of first importance. For these authors errors of this type include from 23 per cent (Starch) to 37 per cent (Siers and Diebel) of all oral errors. For Davis, however, errors of this type include only 6.2 per cent

of all errors and for Goltry merely 2.2 per cent. Our data tend to agree more with the results obtained by Davis and Goltry than with the earlier experimenters. Only Group IV of our normal children and Group I of our mental defectives make a sizeable percentage of errors in this category: 2.8 per cent for the normal children and 4.6 per cent for the mental defectives.

Since the Siers and Diebel, Charters-Miller, Fillers, and Starch studies date back to the decade between 1909 and 1917, while the Davis and Goltry researches were carried out within the past few years, the influence of concentrated teaching to eliminate errors of this type may be the cause for the difference found by the earlier and more recent authors. It should be remembered that the Charters and Miller research as well as the other earlier studies made a great impression on teachers of grammar and English between 1915 and 1925; and it is therefore reasonable to suppose that efforts to eliminate oral errors in this category were enthusiastically carried on on a wide spread scale.

4. *Children Show Confusion in the Use of the Adjective Adverb*

With the exception of Starch, all experimenters rank this error as one of the 10 most frequent which children make. Because of this we can be certain that this error should be studied further and should receive increasing emphasis in English curricula. In fact errors such as "she didn't succeed very good" and "he's pretty near got him down on the ground" were found to be so common in our study that the classification received fourth ranking for Group II, normals, and sixth ranking for Group IV, normals. Although in the Goltry study this error may also be ranked in fourth position, in all of the other researches the classification is ranked either seventh or eighth.

Percentages of total mistakes which may be assigned here vary from 1.7 per cent for the city mental defectives in our study to 6.6 per cent for our normal Group II. In comparison with the normal groups of children it is interesting to note that the mental defectives confuse the adjective and adverb less frequently. Thus, neither group of mental defectives made more than 1.7 per cent of its total mistakes in this connection.

5. *The Construction "Sort of" and "Kind of" is Used Frequently*

Among the oral mistakes which children made in the adjective-adverb category, the constructions "sort of" and "kind of" were heard frequently. In most cases children used these constructions to qualify other adjectives and verbs or verb parts. "Sort of" and "kind of" appeared in the child's language

when he was certain about an action in a picture or about some statement that he was about to make. In regard to a facial expression of one of the characters in a picture, many children responded by saying, "She's looking sort of queer." In regard to a definite action in a picture, others said, "The man is kind of like kneeling."

Although the earlier experimenters make no mention of this type of error, both Davis and Goltry recorded this construction during their research work. Davis, upon analyzing her protocols, found that 1.8 per cent of all oral mistakes made by her group could be grouped under "sort of" or "kind of." Goltry, on the other hand, found that fully 4.6 per cent of all errors could be classified in this manner. With us the percentages varied from 2.7 per cent for the city mental defectives to 5.0 per cent for the Group II of normal children. Mental defectives of higher chronological age used these constructions about as frequently as younger, normal children. Since these constructions have been reported by at least three different experimenters, using different stimuli for oral language, and employing different samples from different parts of the United States, we should consider them important in children's oral language. Of greatest interest is the fact that these constructions are employed to express an uncertainty by children. This commonness of the use of the phrases "sort of" and "kind of" by children in Iowa and Minnesota as well as by adolescents in an institution for mental defectives merits further research.

6. *There is Disagreement in the Use Which Children Make of the Double Negative and of the Double Subject*

Two decades ago much attention was given by teachers of English to children's use of the double negative. At that time such oral language as "It wasn't no good" or "You can't play no more" was observed and recorded very often by elementary school teachers and by various experimenters. In fact, in both the Fillers and Siers and Diebel studies, this error was third in occurrence, outranking such errors as the "verb not agreeing with subject in person and number" and "confusion of the adjective and adverb." Results very similar to these were obtained by Charters and Miller and by Starch who ranked the use of the double negative fourth and fifth in occurrence.

When the Goltry data, the Davis study, and our results are compared with the earlier work done in this field, a marked difference is evident. While the earlier experimenters recorded the fact that from 10.3 per cent to 14.0 per cent of all mistakes made could be categorized under the use

of the double negative, Davis could discover only 2.6 per cent, our data revealed only 1.5 per cent for the city mental defectives, 0.4 per cent for the institution defectives, and 0.0 per cent for both normal groups. Goltry in his study could find only 0.4 per cent.

It is interesting to search for the reasons for this difference between researches which were made as much as 25 years apart. Could the difference be explained on the basis of a teacher bias for such an error? Did the teachers who did the recording in the early studies have a mental set for just this sort of error? In this connection it should be recalled that the research studies completed since 1930 were in all cases recorded with greater objectivity than were the earlier researches. In the final analysis it is significant that *not even one* of the 108 normal children examined by us used this construction in their oral language. On the basis of our findings as well as those of Davis and Goltry we would certainly deemphasize the importance of the double negative. Certainly, the teacher's time could more profitably be spent helping children use the correct verb for the exact situation, or end the confusion which exists in the use of the adjective and adverb.

According to Table 8, both of our normal groups of subjects made more mistakes in classification No. 24, the double subject, than in any other single classification. When we looked for this classification in other research studies, we found either that it was not mentioned or that it had been included under the general category of syntactical redundancy. Of all the experiments that we examined, only Davis mentions the fact that "a redundant pronoun form, perhaps intended to emphasize the subject, was very common, in sentences like, 'This Indian, he comes riding up.'" Obviously, those who had investigated the question of oral errors have never attempted fully to analyze the category of syntactical redundancy. Our analysis of this category has revealed that it is made up almost completely of double subject usage. Thus, the use of the double subject represents 78.2 per cent of all errors made by our Group II normals in the syntactical redundancy category. For our Group IV, normals, the identical percentage is 82.7 per cent. Although Davis mentions that the use of the double subject was very common for her group, she states that the most frequent type of error in her syntactical redundancy category was the use of the superfluous "here."⁶ This error was represented by such expressions as "this here man." Our research fails

⁶That the subjects in the Davis research used the superfluous "here" so frequently may probably be ascribed to the stimuli and situations provoking the oral language. Since the child was permitted to play with objects and toys, he could more easily use his fingers for pointing and therefore was more readily prompted to say "this here soldier."

to substantiate this result. Not more than 6.7 per cent of the errors made by either of our normal groups can be traced to a superfluous "here." According to our research, the use of the double subject is by far the most frequent mistake made in this category.⁷ The fact that the results obtained for our normal Group IV are almost identical with those obtained for our normal Group II points to the stability of such a conclusion.

Finally, we mention three oral errors which were considered of primary importance by the four 1917-1920 researchers, in fact three of the four placed these errors among their 10 highest ranking ones:

1. Confusion of demonstrative adjective and pronoun.
2. Personal pronoun placed first in a series.
3. Subject of verb not in nominative case.

While these authors may have found such errors occurring very frequently in their protocols, Davis, Goltry, and our own research failed either to detect such errors or listed them so infrequently that they were considered of minor importance.

G. SUMMARY AND CONCLUSIONS

In making the present research our plan was, first, to measure the oral errors of normal school children and mentally defective adolescents over a wide age range. Second, we desired to compare these two groups in regard to the number and types of oral errors which they produced. Third, upon the basis of our research as well as the research work done by others, we were interested in relating children's oral errors to the task and responsibility of the teacher. As a corollary to our mensuration of oral errors we wanted to learn whether or not it would be practical to attempt the standardization of a test of oral errors.

In order to achieve our purposes, we devised a means of measuring oral errors which we found was at the same time novel, valid, and reliable. Our technique, detailed in the preceding pages, concerned, first, a "peep show" device in which picture stories devoid of reading matter were projected. Second, exact stenographic reports were obtained of each child's response to the picture stimuli. Third, standard directions were given to each child, and standard methods of procedure were employed in every case. Fourth, reliability tests were administered.

After much experimentation we based our analysis of oral errors upon

⁷For our normal Group II, both double subject and superfluous "here" account for 83.3 per cent of errors in syntactical redundancy. For our normal Group IV, these account for 89.4 per cent of the mistakes in syntactical redundancy.

the first 60 clauses that each subject articulated. In doing this we defined the concept of a clause and gave concrete directions and examples for the selection of clauses. That our method of counting clauses was reliable was readily attested by correlations of $+.95$ and $+.96$ obtained between the tabulations of the senior and junior authors.

Our final selection of the types of oral errors to be considered was made only after an exhaustive review and analysis of all research studies, authoritative books, and manuals in the field. With these works as our guides, we were able to detect 42 separate oral errors in our subjects' compositions. Before attempting detection of these errors, however, we set up a list of specific rules and examples which could be followed by others. Employing these rules, we found that the detection of oral errors proved to be a highly reliable procedure. Because of these data, we concluded that it would be profitable and worthwhile to attempt standardization of a test of oral errors.

In order to be more certain of any results obtained, we employed duplicate samples of normal and mentally defective subjects. Accordingly, our Groups I and III, consisting of 72 and 61 mental defectives, were drawn respectively from the Minnesota School and Colony and from the Minneapolis Public Schools. We then selected normal school children, Groups II and IV, to match Groups I and III, subject for subject, in mental age, sex, and socioeconomic status. Since these variables were being held constant, we were able to study the influence of chronological age on the production of oral errors.

In stating our results we decided to orient them with respect to certain questions which we felt have underlain and made practical the present research:

1. *Questions of a Theoretical Nature*

a. Many authors have shown that mental defectives differ from matched groups of normal children in various mental and motor traits. In most cases researchers have endeavored to control such variables as mental age, sex, home background, and physical disability and to permit only the chronological age to vary. Based upon the actual number of variables which have been controlled, all such studies have, to a greater or lesser degree, demonstrated the influence of chronological age on the mental or motor trait in question. In our study, then, what differences can be attributed to the chronological age factor; or, as some might have it, what differences serve to distinguish between our two groups and especially to characterize the mental defectives?

b. Are there differences between the lower and higher *MA*'s in each group? We were able to make these comparisons because both the range of chronological ages and mean *CA*'s of the sub-groups that we compared differed comparatively little. In this way, while *CA* was under control, mental age was permitted to vary. Since, however, our sub-groups within each large Groups I, II, III, or IV were not matched for *CA*, our results are subject to some error.

c. Do definite sex differences exist within any one group? In this case while the sex factor varied, the chronological and mental ages were roughly the constant factors. Here too, no attempt was made to match our sub-groups with respect to *MA* and *CA*.

d. Do mental defectives who reside in a city community environment differ in oral error production from those who reside in an institution? In this case the environmental factor was chosen as the variable while the other factors such as mental age, chronological age, and socio-economic status of parents were assumed to be constant.

2. *Questions of Practical Significance*

Since programs of oral English in our elementary and high schools have few research studies as their basis, our results should be able to aid educators and teachers in the construction of more scientific curricula. Of what practical import, then, is this study to administrators, curriculum experts, and teachers?

With respect to Question 1a, two results pointed toward the existence of definite differences between the two groups. After analyzing our data, we found that: (a) Both groups of mental defectives made a significantly greater mean number of oral errors than their matched normal groups. (b) The males of Group I and Group III produced a significantly greater mean number of oral errors than the males of Groups II and IV.

Since these differences occurred in duplicate situations and since they were in each case significant, we are reasonably certain that mental defectives are prone to make more errors in oral English. Further, while our groups of mental defectives tend to concentrate their errors under the category "verb and verb parts," the normal groups divide their concentration under categories "syntactical redundancy" and "verb and verb parts."

More specifically, while the use of the "double subject" was the most important error for both groups of normal children, the "Failure of verb to agree with subject in person and number" was the most frequently occurring error for our two groups of mental defectives.

Our results in connection with Question 1*b* differed from 1*a* in that we were unable to find any significant differences existing between lower and higher mental age groups. In spite of this, we discovered that the mentally retarded adolescents with higher *MA*'s (9-6 to 10-5) consistently made more mean oral errors than those with lower *MA*'s (8-6 to 9-5). While consistent differences in total oral errors involved only mental defectives, the following more specific errors involved all groups: (a) Within all groups, normal as well as mentally retarded, the lower mental ages will err more often in "use of verb and verb parts" and especially in "omission of auxiliary" than will the higher *MA*'s. (b) Within all groups, the higher *MA*'s will make a greater proportion of their errors in "syntactical redundancy" and especially in the misuse of the constructions "sort of," "kind of" than will the lower *MA*'s.

Although we found no significant differences to exist between these comparisons, the fact that a consistent tendency in one direction was common for all groups indicates the likelihood that stable differences may exist. Less certain, but still worthy of note, are differences which were found within one population only: (a) Within normal groups only, the lower *MA*'s will make a greater proportion of their total errors in the "use of the pronoun" than will the higher *MA*'s. (b) Within normal groups only, the higher *MA*'s will consistently make a greater proportion of errors in the "use of adverbs and adjectives" than will the lower *MA*'s.

Whether definite sex differences existed within any one major group was our next concern. After we had tested all possible mean differences for significance we found the following: (a) Among the mentally defective subjects the males consistently and in two comparisons significantly made more oral errors than did the females. On the other hand, among the normal subjects, the girls tended to make more errors than did the boys. (b) Within every Group I, II, III, and IV, the males proportionately err more often than the females in the "use of the noun" and more specifically in the use of the construction "sort of" and "kind of."

We also found sex differences that were segregated to either the normal children or mental defectives: (a) Within the mentally retarded groups only, the females more often than the males make errors in the "use of verb and verb parts." (b) Within both groups of normal children, the females err more often than the males in the category "syntactical redundancy" while the males make more errors in the "use of adverb and adjective."

When we attempted to vary the factor of environment and to compare institution mental defectives with mental retardates residing in a city com-

munity, we found that the similarities between the two groups by far outweighed the differences. It would seem that the mental age and chronological age factors are of more importance in determining the amount and type of oral errors produced. Certain interesting and consistent differences did appear, however: (a) In every comparison between total Groups I and III and between like Sub-Groups of I and III, the institution for mental defectives made a greater mean number of oral errors than did the city mental retardates. (b) From a qualitative standpoint, a close similarity was noted in the type and kind of oral errors produced by two groups. First, each group's errors were distributed in a similar fashion in seven out of ten grammatical categories. Second, the four most common oral errors made by Group I were also made by Group III. Third, seven of the first ten most frequently occurring oral errors (see Table 8) made by Group I were also made by Group III. (c) Institution defectives do, however, make more frequent errors than city defectives in "syntactical redundancy." City defectives, on the other hand, err more frequently in the use of the verb, prepositions, and conjunctions.

Of what import is our study to school curriculum makers and to educators in general? Since we had chosen representative samples of normal children and had compared our research with the work of others, we were able not only to make a reliable list of the most important and most frequent oral errors but also to note specific trends in oral error production. Teachers will be interested in comparing our findings with the curriculum which they are emphasizing at present. Where no definite curricula for teaching oral English exist, teachers should build a simple experimental course of study based on the following data: (a) A great portion of the oral errors which children make can very readily be classified under a few types of oral errors. Upon analysis of our data we found that each of our four main Groups I, II, III and IV, made four errors in common. Under these four common errors could be placed between 40 and 55 per cent of their total errors. When the two groups of normal children, II and IV, were compared we found that they made as many as seven out of their ten highest ranking errors in common. Under these seven errors we classified between 64 per cent and 70 per cent of their total errors (Table 10). To the teacher and educator these data should be important. If fourth and fifth grade teachers spent their time emphasizing only seven types of oral errors, they would be accomplishing most of their task of improving children's oral English.

According to our data, the following error types are common to all groups and rank among the 10 most important errors for every group:

- a.* Use of the double subject. This accounted for 31 per cent of all errors made by each group of normal subjects.
- b.* Failure of verb to agree with subject in number and person. This was most important for both groups of mental defectives
- c.* Wrong verb used. This ranked third and fourth in importance for our two normal groups.
- d.* Misuse of "sort of" and "kind of." One normal group made as many as 5 per cent of its total errors in this error type.

In addition to the errors listed above, the two normal groups made three other errors in common. These could also be included under the 10 highest ranking types (see Table 8).

- e.* Confusion in use of the adjective and adverb. Group II made 6.6 per cent of its total errors in this category.
- f.* Wrong form of verb. Although not as important as those listed above.
- g.* General redundancy. Types *f* and *g* accounted for as much as 3.3 per cent of total errors.

(*b*) When we compared our present results with those obtained by six other investigators, we found that Errors *b*, *c*, and *e* were mentioned by all as being of prime importance.

Besides the seven which we have listed above, each group made errors which were not made by all of the other groups. These, however, could be classified among the 10 most important errors made by a particular group (see Table 8). In order of importance these were Nos. 7, 18, 4, 28, 8, 17 (see Table 4).

We were also interested to learn if errors could be classified under general categories and found that most of them fitted into seven major groups (Table 9). Of these, Nos. 1, 4, 5, and 6 proved to be the most important, with from 83 per cent to 92 per cent of all errors falling under these categories. If teachers would concentrate their instruction on Nos. 1 and 5 only ("errors in use of verb and verb parts" and "syntactical redundancy"), they would help to eliminate from 65 per cent to 80 per cent of all errors that fourth and fifth grade children make.

(*c*) When we compared our work with similar studies undertaken as far back as 1909, we discovered two very interesting tendencies in operation. First, the importance of certain types of oral errors tends to change with time. Thus, "use of the double negative," "use of ain't for isn't, am not, aren't" and "confusion in the use of tense" occurred much more frequently in 1909 than they occur today. Others, however, such as "a verb fails to agree with the subject in number or person" and the "improper use of the

double subject," are of much greater importance today than three decades ago. The "misuse of sort of and kind of" seems to be of recent occurrence since it is not mentioned by earlier investigators. Second, some types of frequently occurring oral errors have retained their importance over a long period of time. For example, in six of the seven studies compared in Table 10, the "improper use of the adjective and adverb" ranks among the 10 most frequent errors.

With these data in mind, teachers and educators must realize that a curriculum of oral English is practical and potent only when it has its basis in recent research work. Where educators are teaching oral English in hit or miss fashion or are emphasizing the same program that was in use a decade or two ago, they are missing their marks by wide margins.

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AN ANALYSIS OF SOME ASPECTS OF FEEDING BEHAVIOR

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A. THE PROBLEM

Perhaps one of the commonest complaints of parents is that their children "won't eat." If the child's lack of appetite or his capriciousness becomes sufficiently severe, he is taken by his bewildered parents to a pediatrician, a psychologist, or a child guidance clinic. His is another feeding problem in the files of the agency.

The present study is not a direct attack on feeding problems. Instead it presents some information about the food habits of a normal group of children, including some children who are very poor eaters, some with voracious appetites, some who are very finicky, and some who accept many types of food. These children are subjects of the child development study of the Samuel S. Fels Research Institute. They are children from central Ohio, unselected except as factors of coöperativeness and permanent residence introduce selective factors. Their general nutritional status is better than normal, but there is no apparent reason why their feeding behavior should be atypical.

During the year 1942, the mothers of 72 Fels children were interviewed by the nutritionist for information about the feeding behavior of children. This interview, conducted by a familiar and well-liked interviewer, was a part of a routine standardized nutrition interview.

The interview itself was systematic in that it covered a predetermined list of topics, but the precise wording of the questions was changed to fit the particular situation. The topics covered by the interview were as follows.

1. *Appetite*, including the following items: consistency of appetite, size and number of servings, speed of chewing and other indications of greediness, enthusiasm for meals, frequency of food between meals, and treatment of the child to improve his appetite.

2. *Finicalness*, including items on food likes and dislikes, resistance to new foods, new methods of preparation, and details of preparation.

3. *Behavior at the table*, including manners, distractability during meals,

*Received in the Editorial Office on November 27, 1943.

amount of activity at table, conversation at table, avoidance techniques such as dawdling, spilling, cheekpacking, etc.

On the basis of the interview the interviewer made a rating of each of the three variables, *appetite*, *finicalness*, and *behavior at the table*. These sets of ratings furnish the raw data for the present study.

The choice of these three variables for rating was guided by the interview results, by a priori opinions, and by other publications on feeding behavior. Poor appetite has been frequently studied as one aspect of feeding problems. Appetite seems to be one obvious variable for describing feeding behavior. Finicalness has not always been separated from appetite in the studies of feeding problems. Inspection of the interview material made it seem profitable to separate it from appetite because there are a number of children who have poor appetites, but who are not finical, and others who are finical but have good appetites. The third variable, table behavior, is not so important in the study of feeding problems, but it did not seem very reasonable to combine it with either of the other variables, nor did we think it should be ignored.

B. RESULTS

1. *Analysis of the Feeding Behavior Scales*

When the distribution of the ratings on each scale are plotted, it is clear that the distributions are far from normal. In fact, they are either rectangular or *U*-shaped. This distribution reflects the crudity of the scales themselves and the tendency of the interviewer to make extreme classifications. For her children tended to be either good eaters or poor eaters, seldom were they in between. We have somewhat gratuitously attributed the distribution to the bias of the rater. It is possible that there is a genuine, *U*-shaped distribution of feeding behavior, but the present study is in no position to test such a hypothesis.

Because of the dichotomous nature of the ratings, the data seem to invite a contingency treatment. Each of the variables was divided into two ranges, a high range (rating above 50) and a low range (below 50). The whole group is thus divided into eight subgroups as shown in Table 1. From this figure a number of hypotheses concerning the relationship between variables may be used.

The hypothesis that the three variables, appetite, finicalness, and table behavior are mutually unrelated is definitely refuted by the X^2 test. The value if chi square, 26.87 with three degrees of freedom is equivalent to a probability much less than .01.

TABLE 1

	Poor appetite		Good appetite		Total
	Poor table behavior	Good table behavior	Poor table behavior	Good table behavior	
Finical	20 26.4%	3 3.9%	7 9.2%	3 3.9%	33 43.4%
Not finical	13 17.2%	4 5.2%	9 11.9%	17 22.4%	33 55.6%
Total	Poor appetite 40 52.7%		Good appetite 36 47.3%		76
Total	Poor table behavior 49 64.7%		Good table behavior 27 35.3%		100.0%

If each of the variables is held constant, the hypothesis of independence of the other two variables may be tested. This corresponds to a partial correlation but is determined from a contingency table. In the present case, the only pair of variables which are clearly related are appetite and table behavior. Even when finicalness is held constant, the hypothesis of independence of appetite and table behavior can be refuted with a probability between .01 and .02. The tests of the other two partial correlations yield probability greater than .05.

These findings can be interpreted as follows. Tolerance and appetite are essentially unrelated to each other. Appetite is definitely related to table behavior. That is, people with poor appetite usually have poor table behavior. That is reasonable on several grounds. Parents tend to interpret poor appetite as poor table behavior. The child's reaction to parental urging to eat is likely to be socially unacceptable. There is a much smaller relation between finicalness and table behavior. The correlation is positive but not significant.

Inspection of Table 1 reveals that the correlation between appetite and table behavior is largely due to the fact that the group of children with high table behavior is a subgroup of the cases with high appetite. There are only seven children who have low appetite and high table behavior. There are, however, 16 children with low table behavior and high appetite. The high appetite group is much larger and includes nearly all the cases of high table behavior.

2. *Relation of Feeding Behavior to Physical Status*

If the ratings on appetite are trustworthy statements of the child's food intake, we might expect that there would be considerable difference between

the physical status of the children with good appetite and the children with a poor appetite. If a poor appetite would lead to malnourishment, then we might expect that the height, weight, and height-weight index of the children would show some changes as a result of the poor appetite.

When all the children with good appetite are grouped together, and the children with poor appetite grouped together, we find the differences in physical status indicated in Table 2.

TABLE 2

Variable	Average of high appetite group	Average of low appetite group	Difference	CR	P
Weight	+ .32	— .16	.48	1.72	.08
Height	+ .41	— .15	.56	1.94	.04
Wt./Height	.27	— .20	.47	1.73	.08
Iliac width Height	— .13	+ .07	.20	.73	.48

The numbers in Table 2 are averages of standard scores on which the Fels average is 0 and the standard deviation is 1. Only one of the three differences is at the 5 per cent level of significance, but the others are nearly significant. Children with poor appetites tend to be less well developed according to the measures of height and weight but not significantly so. The fourth difference between the two groups is a skeletal measure, the distance between the iliac crests, divided by the height. This was introduced as a control of the body build. There is evidence that children with poor appetites tend to be more linear in their body build. The slight evidence from this study does not confirm that finding. On the other hand the evidence from this study does make the differences in height and weight more interesting. It will be noticed that the group with poor appetite tend to be above the average in the iliac-length index. That is, they are broader for their height than the average. Therefore we would predict that they would tend to be slightly above the average in their weight-height index. Nevertheless, they are below the average in height, weight, and weight-height index. Exactly the opposite holds true for the group with good appetites. They are somewhat narrower in their skeletal build, yet are somewhat heavier, and heavier for their height than the average. It is not possible at the present time to assign a statistical probability to this difference, but the general influence of the measures on iliac-length index is to increase the significance of the difference on the other categories.

In summary, it appears that children with poor appetites tend to be slightly lighter and shorter than children with good appetites. Whether this is because of nutritional deficiencies cannot be determined, but it is not inconsistent with that hypothesis. On the other hand, the difference in height and weight is not large enough to be statistically significant, certainly not large enough to justify anxiety about the development of the children with poor appetite. The children with poor appetite are slightly below the average in height and weight, but are clearly within the normal range.

3. *The Relation of Feeding Behavior to Home Environment*

For this analysis, we will use the parent behavior ratings (1) made by the home visitor, during the same period that the feeding behavior interviews were being conducted. The method of analysis was as follows: First, all of the children with high ratings on appetite were compared with all of the children with low ratings on appetite. Second, the children with high ratings on tolerance were compared to children with low ratings. Third, the children with high and low ratings on table behavior were compared with each other. These three pairs of groups were studied in relation to each of parent behavior variables. That is, the average rating of the high appetite group on each variable was compared to the average rating of the low appetite group. The differences between the averages are shown in Figure 1. If there is no difference between the two groups, the point is on the middle vertical line. If the high appetite group has a higher average rating than the low appetite group, the point for that variable is located to the right of the middle line. If the high appetite group has a lower rating than the low appetite group, the point is located to the left of the middle line. In other words, Figure 1 plots the difference between average of the high appetite and the low appetite group. This difference may be greater or less than zero. The distance of the point from the middle line indicates the size of the difference. If it is significant at the 5 per cent level, the point will be outside of the 5 per cent lines, and if the difference is significant at the 1 per cent level, the point will lie outside of the 1 per cent lines.

Figure 1 shows the results of the three comparisons listed above, i.e., good and poor appetite; high and low finicalness; and good and poor table behavior. It would appear that appetite and finicalness show no clear cut statistical relationship to the parent behavior variables. Nevertheless, a study of the pattern of differences yields some interesting hypotheses.

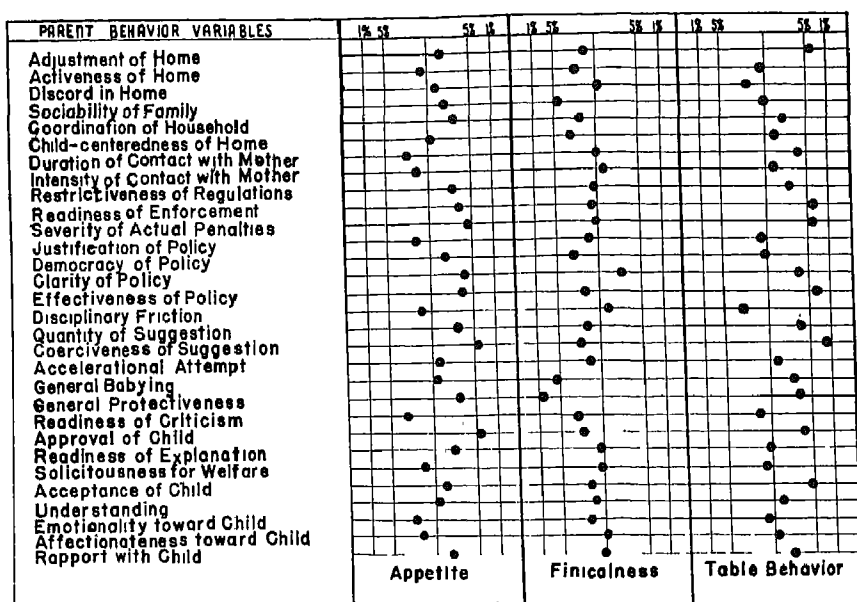


FIGURE 1

The following parent variables show a difference of more than one standard deviation between the high and low appetite groups.

- | | |
|--------------------------------|--------------------------------|
| Coördination of household | Rapport |
| Clarity of policy | Restrictiveness of regulations |
| Effectiveness of policy | Severity of punishment |
| Approval | Quantity of suggestion |
| Protectiveness | Coerciveness of suggestions |
| Lack of readiness to criticize | |

All of the differences are in the same direction. That is, the children with good appetites tend to come from homes rated high on these variables. While only two of these variables show a significant difference, they seem to lead to a reasonable hypothesis concerning eating behavior. In general good appetite is fostered in homes which are efficiently managed with clearly established rules whose infraction is punished. The parents in such a home are restrictive in their regulations and demand obedience, yet they manage to give the general impression of approval. Perhaps they can be approving because their demands are accepted. Their success in getting the child to eat his meals is only an example of a generally effective policy of child management.

An analysis of the statistical comparison of the children who are finical

about their food with those who have no violent likes and dislikes reveals that a different pattern of parental treatment is important. Again there are only two variables which are significant at the 5 per cent level, but the pattern of variables which shows a difference of more than one standard deviation is a reasonable one. The following variables are more prominent in homes of non-finical children.

Protectiveness
 Babying
 Sociability of family
 Child-centeredness of home
 Approval of child

This is quite strikingly different from the analysis of appetite. Apparently the parental methods which induce good appetite in children are very different from those which prevent finicalness. The striking difference is the absence of severity and coercion. It seems that the methods of strict coercion and rigid control may make the child eat, but can't make him like it.

Finally the analysis of table behavior reveals a pattern much like that for appetite. Differences on the following variables are noticeable:

Adjustment of home	Clarity of policy
Severity of penalties	Lack of disciplinary friction
Readiness of enforcement	Quantity of suggestion
Effectiveness of policy	Approval
Coerciveness of suggestion	Acceptance of child

The first five of this list are significant at the 5 per cent level. It would appear that the parents in the groups who are most successful in educating their children to eat in the socially approved manner are those who are strict and coercive in their control, but whose policy is clearly defined and whose attitude toward the child is one of approval and acceptance. The fact that these same variables are the important ones in the analysis of appetite, would lead to the supposition that parents whose children have good appetites are also the parents whose children have good manners. This confirms the correlation between table behavior and appetite reported in the first section.

If the comparison between high and low table behavior is limited to those cases with good appetites, the same pattern of differences is found but they are greater and more significant. Those parents who stress table behavior over and above appetite are even more restrictive than those who insist on appetite alone.

4. *Relation of Feeding Behavior to Other Aspects of the Child's Personality*

During the period the Fels children are in nursery school, they are ob-

served and rated by a nursery school observer. The scales used for these ratings are those developed by Richards and Simons (2). Since there are not comparable personality evaluations for the older children, the cases in the present section are limited to those children who have been to the Fels experimental nursery school. Thus the sampling of children is somewhat different from that used in the analysis of home environment. The most striking feature of this difference is the age selection. All of the children studied in this section were of nursery school age when rated.

The methodology of the present analysis is identical with that of the analysis of parent behavior. Each of the variables of feeding behavior is studied independently in relation of the child behavior ratings made in nursery school. The results of the three comparisons are shown in Figure 2.

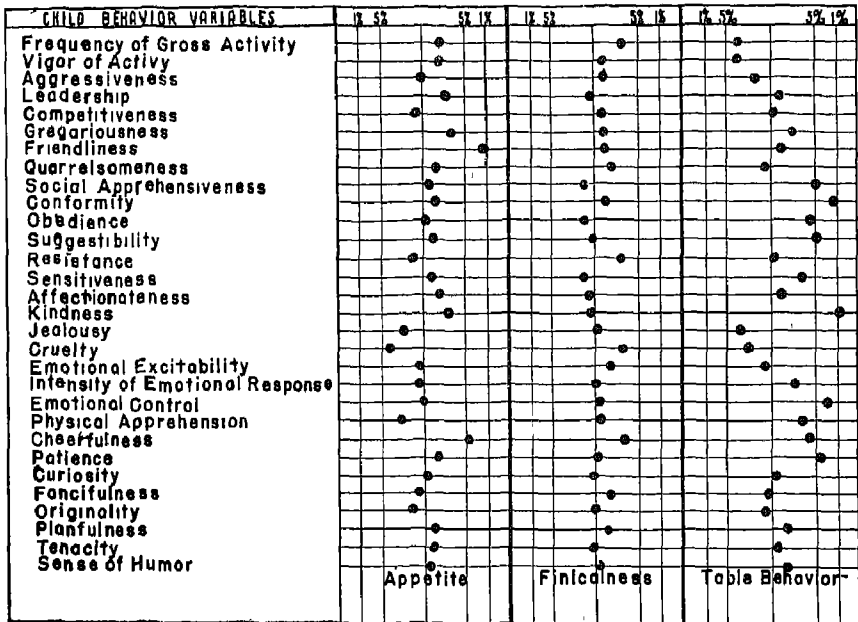


FIGURE 2

When the children with good appetites are compared with the children with poor appetites, the following differences in their nursery school behavior are noticeable. The children with good appetites are higher on the following variables.

Cheerfulness
 Friendliness
 Lack of cruelty
 Gregariousness
 Kindness
 Leadership
 Lack of physical apprehension

The first two of these differences are significant at the 5 per cent level. In general the children with good appetites seem to be better adjusted. They are spontaneously friendly and unafraid yet kind. They are more sociable and better leaders. They seem to be active children, yet not rebellious or aggressive.

When finicalness is analyzed in a similar fashion, no significant differences appear. In fact, there are only three variables in which the difference is as great as one standard error. These three differences are interesting, however, in the light of the other groups. Children who are less finical about food tend to be less cheerful, less active, and less resistant to authority than children who are finicky about their food. The picture of the non-finical child begins to appear as a passive, non-resistant child as contrasted to the child with good appetite who is non-resistant but nevertheless sociable and active.

The analysis of table behavior reveals the greatest number of clear cut differences between the groups. Children with good table behavior are higher in the following variables.

Emotional Control	Lack of cruelty
Conformity	Lack of activity
Kindness	Intensity of emotion
Suggestibility	Obedience
Patience	Physical apprehension
Social Apprehension	Sensitiveness
Cheerfulness	Lack of physical vigor

Those variables in the first column are significant at the 5 per cent level. Clearly the children with good table behavior appeared to the nursery school observer to be more conforming, more fearful and less active, but with a suggestion that their superficial behavior hides an intensely emotional inner life. They show many characteristics like the children with good appetite, yet in the pattern of other variables they definitely appear too passive, too conforming, and too repressed to be well adjusted.

C. INTERPRETATION

A general interpretation of the last two sections, dealing with the home

environment and the personality of the children reveals some interesting conclusions.

It is clear that children who are high in any one of the feeding variables are showing a certain amount of conformity to parental demands and desires. Parents want their children to eat plenty of food, to enjoy a well balanced diet, and to eat with a certain modicum of neatness.

Their methods for attaining this end may differ widely, however, just as their general management of the child differs widely. Their handling of the feeding situation seems to be of a piece with their general behavior. If a parent tries to manage his children by coercive restrictive discipline, he uses that same technique in eating situations. If, on the other hand, he is lax and easy going in other situations he tends to show the same type of behavior at the table.

The pattern of parental behavior marked by coercive and restrictive discipline, attained through the frequent use of severe penalties but nevertheless accompanied by a genuine approval and acceptance of the child seems to be the most frequently successful method of inducing the child to eat sufficient food and to eat it in a socially acceptable fashion. There are apparently two types of parents in this general class, one who insists that the child eat, the other who in addition insists on socially acceptable table behavior. The second type seems more inclined than the first to adopt stringent methods of discipline.

The children who are raised under these methods of parent handling eat well, they are in general conforming in their behavior. However, the children who live under the more exacting demands of the second type of parent who stresses the superficialities of table behavior show quite a different pattern of conformity than does the child of the first type of parent who limits his insistence to the more fundamental question of appetite.

Children who are coerced into socially acceptable forms of table behavior tend to be conforming, fearful, repressed, inhibited, and unhappy. Perhaps good table behavior requires more self-control and inhibition than should be expected of the normal nursery school child. It can be attained by coercive measures but usually at the expense of the child's spontaneity. Of course it is not necessarily the coercion at the table which produces these far reaching effects. Instead, coercion in regard to table behavior is only a symptom of an extreme pattern of coercion and this consistent parental policy is productive of the unhappy results on the child's personality.

On the other hand, children who are coerced into eating sufficient food but who are not, in addition, forced to conform to social standards of table

behavior are also conforming. But their conformity is accompanied by general cheerfulness, freedom from fear, and social leadership. They seem to be well-adjusted children quite in contrast to the previous group. Again it is not the parental handling of table behavior which is the direct cause of so much excellence. Probably the parental handling of feeding is again a symptom. Parents of this type may well be those who set up reasonable limits of behavior but enforce these limits strictly. They do not, however, force the child to conform completely to an adult pattern of behavior. They accompany their discipline with an approval and acceptance which gives the child security. This general pattern is reflected in the better social adjustment of the children.

Neither of these coercive patterns, however, is sufficient to obtain conformity in the matter of food likes and dislikes. Apparently a child cannot be coerced into liking food, even if he may be coerced into eating it. The parental pattern which does result in general acceptance of different kinds of foods seems to be one of affection, approval, and attention. Children raised under such a regime may or may not eat heartily. That depends on other factors, but they do not develop intense food dislikes. It is not clear from the present study that this is accompanied by any characteristic pattern of general adjustment. There is very slight evidence that such children are more passive in their adjustment, but little weight can be attached to those findings.

These statistical findings represent general trends. There are individual cases in which the statistical trend may be contradicted. They do not describe every case of feeding behavior but show some of the more frequently encountered patterns.

D. SUMMARY

A group of children were rated on three aspects of their feeding behavior: (a) appetite, (b) finicalness, (c) table behavior. The relations of these variables to physical status, home environment, and child personality were studied.

1. There is a tendency for children who have poor appetites to be less well developed physically, but not significantly so.

2. Good appetite and good table behavior tend to appear in homes which are restrictive and coercive in their discipline but in which the child still receives approval. The severity is more marked in the homes producing good table behavior, the approval is clearer in homes which produce good appetite. A lack of finicalness appears to be related to a pattern of parental approval, interest, and protectiveness.

3. Children who have good appetites, good table behavior, or are not finical tend to be conforming, but in the case of finicalness, insignificantly so. The type of conformity found in children with good appetites seems to be a spontaneous happiness which makes non-conformity unnecessary and which leads to a generally good adjustment. In the case of children with good table behavior the conformity is more clearly a type of repression and the general picture is that of fearfulness, inactivity, and social isolation.

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ANALYSIS OF SEX TEMPERAMENTS IN TERMS OF THURSTONE-TYPE ATTITUDE ITEMS*

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Terman and Miles in their book *Sex and Personality* (6) suggest that analysis of sex temperaments in terms of Thurstone-type attitude scale items may well be profitable. The purpose of this report is to explore this possibility and to describe any sex differences revealed by such an approach. Data for the study were collected during the years 1937 to 1941 at Stanford University and at the University of Connecticut. They are a by-product of research undertaken in connection with the discovery, isolation, and measurement of certain primary social attitude variables (2, 3, 4, 5). Results, for the most part, are negative, but the few positive results are in conformity with other evidence concerning the nature of sex differences.

The items revealing significant sex differences have been grouped, in accordance with a classification suggested by the primary social attitude data, in Tables 1, 2, and 3. Tables 1 and 2 are based upon the responses of 300 men and 300 women, but Table 3 is based upon the responses of only 239 men and 192 women. Each table shows: (a) the per cent of men who responded favorably to each item; (b) the per cent of women who responded favorably to each item; and (c) the tetrachoric correlation between sex of the respondent and the item response.¹

The data in Table 1 show that men, more frequently than women, believe that only the ignorant and superstitious oppose evolution, that if Biblical accounts conflict with the findings of science the Bible must give way, that the biological demonstrations of evolution are beyond dispute, that all books on biology should stress the evolutionary viewpoint, that the evolutionary viewpoint is the only reasonable viewpoint of life, that no intelligent person can believe the Bible in preference to the theory of evolution, that opposition to evolution is due simply to ignorance, that although not believing in God they are open-minded about the mysteries of life, and that there

*Received in the Editorial Office on December 6, 1943.

¹In determining the significance of the correlations the standard error of a tetrachoric correlation has been assumed to be twice that of a Pearson *r*. Furthermore, each tetrachoric correlation twice the size of the assumed standard error of a tetrachoric correlation of .00 has been considered significant.

TABLE 1
ITEMS ON PRIMARY SOCIAL ATTITUDE VARIABLE NO. 1 (RELIGIONISM) WHICH REVEAL
SIGNIFICANT SEX DIFFERENCES

Item	% Yes		<i>r</i>
	Men <i>N</i> =300	Women <i>N</i> =300	
1. Although I do not believe in God I am open minded about the mysteries of life	34	24	.19
2. Only the ignorant and the superstitious oppose evolution	34	22	.21
3. If the biblical accounts conflict with the findings of science then the Bible must give way	70	54	.26
4. The biological demonstrations of evolution are beyond dispute	44	34	.16
5. All books on biology should stress the evolutionary viewpoint	64	52	.19
6. The evolutionary theory is the only reasonable viewpoint of life	50	38	.19
7. No intelligent person can believe the Bible in preference to the theory of evolution	38	28	.18
8. Opposition to evolution is due simply to ignorance	36	26	.18
9. There should be no restriction on the distribution of birth control information	64	40	.27
10. My faith in God is complete for "though he slay me, yet will I trust him"	34	46	— .20
11. My idea of God develops with experience	72	80	— .17
12. God is the underlying reality of life	54	68	— .22
13. The idea of God means much to me	54	64	— .18
14. Though at times I am perplexed, I still trust in the underlying reality of God	64	76	— .21
15. The idea of God gives me a sense of security	62	76	— .25
16. The idea of God is the best explanation for our wonderful world	42	52	— .17
17. I would rather die than give up my faith in God	22	36	— .26
18. The belief in God is fundamental in my life	34	54	— .31
19. I am not quite ready to accept the doctrine of evolution	34	44	— .18
20. I do not entirely understand the evolutionary theory so I am doubtful of its truth	28	40	— .20
21. It is better to believe in God than in evolution	34	46	— .20
22. I am still somewhat hesitant about accepting the theory of evolution	38	48	— .17
23. Birth control is justifiable only in cases of poverty or poor health	20	32	— .22

should be no restriction whatever on the distribution of birth control information.

In contrast, women, more frequently than men, state that their faith in God is complete for "though he slay (them) yet will (they) trust him," that (their) idea of God develops with experience, that God is the underlying reality of life, that the idea of God means much to (them), that even though perplexed (they) believe in the underlying reality of God, that

TABLE 2
ITEMS ON PRIMARY SOCIAL ATTITUDE VARIABLE NO. II (HUMANITARIANISM) WHICH
REVEAL SIGNIFICANT SEX DIFFERENCES

Item	% Yes		<i>r</i>
	Men <i>N</i> =300	Women <i>N</i> =300	
1: Under some conditions war is necessary to maintain justice	32	54	.16
2. Although war is terrible it has some value	54	40	.21
3. More severe punishment of criminals will reduce crime	28	20	.16
4. Capital punishment is a very definite deterrent to major crimes	66	56	.17
5. The death penalty is not given often enough	28	20	.16
6. War is often the only means of preserving national honor	36	68	— .49
7. Pacifists have the right attitude, but some pacifists go too far	72	84	— .26
8. War should be avoided at any cost	46	56	— .18
9. Only humane treatment can cure criminals	54	66	— .20

TABLE 3
ITEMS ON PRIMARY SOCIAL ATTITUDE VARIABLE NO. III (NATIONALISM) WHICH REVEAL
SIGNIFICANT SEX DIFFERENCES

Item	% Yes		<i>r</i>
	Men <i>N</i> =239	Women <i>N</i> =192	
1. Nobody has any right to dictate to me what I shall read	71	60	.19
2. Censorship is absurd because no two people agree about morality	40	27	.22
3. It is a shame that so many fine books and plays have been suppressed by the censors	73	62	.18
4. People should be allowed to make their own distinctions between good and bad	64	53	.16
5. I doubt if censorship is wise	38	24	.24
6. A truly free people must be allowed to choose their own reading and entertainment	73	56	.29
7. We have too many laws	75	60	.24
8. After all, the law is merely what people do	62	51	.17
9. The law is often the refuge of the scoundrel	76	62	.24
10. Workers can hardly be blamed for advocating communism	71	60	.19
11. It is too early to judge communism by its results in Russia	82	71	.21
12. The American ideal of bigger, faster and more doesn't appeal to me	29	44	— .26
13. Our national morality is safeguarded by censorship	25	36	— .19
14. Censorship is effective in raising moral and aesthetic standards	35	53	— .30
15. The law represents the wisdom of the ages	60	69	— .16
16. The less one tampers with the law, the better	29	42	— .21

the idea of God gives (them) a sense of security, that the idea of God is the best explanation for our wonderful world, that (they) would rather die than give up (their) faith in God, that belief in God is fundamental in (their) life, that (they) are not quite ready to accept the doctrine of evolution, that (they) do not entirely understand the evolutionary theory but are nevertheless doubtful of its truth, that it is better to believe in God than in evolution, that (they) are still somewhat hesitant about accepting the theory of evolution, and that birth control is justifiable only in cases of poverty or poor health.

Most studies on sex differences have shown that women as a group tend to be more religious than men. In this regard, therefore, this study is no different from many others. It does show, however, that the lower religious scores of men may be due to their greater positive belief in evolutionary doctrine rather than to their lesser belief in the reality of God. The writer has previously shown that the primary attitude variable, *Religionism*, is a structure of specific attitudes in which the tendency to believe in the reality of God is negatively correlated with tendencies to believe in evolution and in the practice of birth control. This organization of attitudes definitely suggests that low scores in *Religionism* may be considered as a function of positive attitudes with respect to evolution and birth control. Since the item analysis reveals only two birth control items with significant sex differences, however, the chief contrast is between attitudes toward the reality of God and belief in evolutionary theory.

Table 2 shows that men, more frequently than women, believe that under some conditions war is necessary to maintain justice, that although war is terrible it has some value, that capital punishment is a very definite deterrent to major crimes, that the death penalty is not given often enough, and that more severe punishment of criminals will reduce crime. On the other hand, women, more frequently than men, believe that war is often the only means of preserving national honor, that pacifists have the right attitude but some pacifists go too far, that war should be avoided at any cost, and that only humane treatment can cure criminals.

These results are in agreement with the general belief that women as a group are more humanitarian than men, but it does not add much more than an additional bit of evidence. They do show, however, that women, in being more humanitarian than men, are more pacifistic, believe less wholeheartedly in capital punishment, and are less favorable to the harsh treatment of criminals than men. These results are in agreement with the structure of the primary social attitude variable, *Humanitarianism*, composed of posi-

tively interrelated attitudes toward war, capital punishment, and the treatment of criminals. The sex differences in this area are less pronounced than in the case of *Religionism*, however, for fewer of the items yield significant sex differences.

The data assembled in Table 3 show that men, more frequently than women, believe that nobody has any right to dictate to (them) what (they) shall read, that censorship is absurd because no two people agree about morality, that it is a shame so many fine books and plays have been suppressed by the censors, that people should be allowed to make their own distinctions between good and bad, that (they) doubt if censorship is wise, that a truly free people must be allowed to choose their own reading and entertainment, that we have too many laws, that after all the law is merely what people do, that the law is often the refuge of the scoundrel, that workers can hardly be blamed for advocating communism, and that it is too early to judge communism by its results in Russia.

On the other hand, Table 3 shows that women, more often than men, believe that the American idea of bigger, faster, and more doesn't appeal to (them), that our national morality is safeguarded by censorship, that censorship is effective in raising moral and aesthetic standards, that the law represents the wisdom of the ages, and that the less one tampers with the law the better.

These results suggest that women tend to have a more favorable attitude toward censorship and a greater respect for the law, but a less favorable attitude toward communism than men. The structure of the primary social attitude variable, *Nationalism*, suggests that women should also be slightly more patriotic than men, but only one item pertaining to patriotism shows a significant sex difference (and in an opposite direction).

The contrasting sex temperaments in the case of the variable, *Religionism* (as stated before), appear to be due primarily to differences in specific attitudes toward God and evolution. Those noted in connection with the variable, *Humanitarianism*, appear to be due about equally well to specific attitudes toward capital punishment and the treatment of criminals but even more so to attitudes concerning war. Differences noted with respect to the variable, *Nationalism*, appear to have their principle root in specific attitudes toward censorship.

These observations are in agreement with those made by Vernon and Allport (7) that men, on the Allport-Vernon *Scale of Values*, tend to secure higher scores than women in the theoretic, economic, and political scales while women tend to secure higher scores on the aesthetic, social, and

religious scales. The results are in agreement with those secured by Carter and Strong (1) which show, among other things, that men prefer scientific, legal, and political activities; whereas women prefer, among other things, social and religious activities. The conclusions also agree with those of Terman and Miles (6) to the effect that women tend towards kindly or sympathetic activities while men tend towards excitement and adventure; that women are more correctly informed about topics appealing to sympathy and maternal interest whereas men are more correctly informed about topics of political, business, economic, and scientific interests; that women express a more distinctive degree of anger, more disgust and more pity than men, whereas men are more frequently defective in their emotional responses; and that women, more frequently than men, exhibit habits that imply timidity and active sympathy whereas men, more frequently than women, exhibit habits of adventure or courage.

Since items contained in the Allport-Vernon *Scale of Values*, Strong's *Vocational Interest Test*, Terman and Miles' *Attitude-Interest Analysis Test*, and the various Thurstone attitude scales are, for the most part, distinctly different in nature, the essential similarity in sex temperaments they reveal is notable. It will now be interesting to discover whether the addition of Thurstone type attitude items to scales of the Strong or Terman-Miles' type contribute anything to the sex differentiations the latter scales are known to make so well.

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LANGUAGE ANALYSIS IN BRAIN-INJURED AND NON-BRAIN-INJURED MENTALLY DEFICIENT CHILDREN*¹

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A. INTRODUCTION

In a series of experiments with children mentally deficient due to brain-injury the formation of conceptual relationships has been shown to be impaired. This type of mental process comes into play when subjects are required to group objects or to relate ideas. Therefore several of the experiments devised for these studies have employed some variation of the sorting test procedure. In such situations, subjects are asked to organize into groups, toy or commonplace objects, pictures, or symbolic forms according to their common features. Findings have consistently indicated that brain-injured mentally deficient children tend to form relationships that are far-fetched or unusual; i.e., they tend to relate the test material on bases which are ordinarily conceived of as being non-essential or inconspicuous.

The findings from three experiments of the series are presented in brief to illustrate this particular characteristic of brain-injured mentally deficient children. In a multiple choice situation (7) the children were confronted with three commonplace objects such as a box, a candle, and a whistle, and were told to select the one which "goes best" with a fourth object. This procedure was duplicated 18 times with a large variety of material. Seventy-nine per cent of all responses of the endogenous group dealt with the most common combinations whereas only 47 per cent of the responses of the exogenous group dealt with these combinations. In other words, the pairing made by non-brain-injured mentally deficient children tended to be orthodox, those by brain-injured children were often unusual and even peculiar. For example, brain-injured children grouped together a pipe bowl and a metal whistle while non-brain-injured children most frequently associated the pipe bowl with the pipe stem. Another example: a piece of paper with the word "ball" was grouped with a picture of a bell rather than a ping pong ball.

*Received in the Editorial Office on December 15, 1943.

¹From the Wayne County Training School, Northville, Michigan, Robert H. Haskell, M.D., Medical Superintendent. Studies in the Psychopathology of Childhood and Mental Deficiency supported by a grant from the McGregor Fund, Detroit, Report 59.

Upon questioning it was usually found that pairing was made because the bell clapper was identified as a ball.

In the second experiment (7, 10) the same groups of children were presented with two large pictures one depicting a drowning boy, the other a burning building. The task was to select and place in front of the pictures, small toys which were thought to "go best" with each photograph. Brain-injured children showed a marked tendency for assembling unrelated material, for forming far-fetched relations, for disregarding the ordinary meaning of objects, etc. For example, they interpreted a red poker chip as a rug or a stop light; they defined a piece of wire as a rope to save the drowning boy, or they put a piece of hose near the fire picture explaining, "This is for the babies in the house to suck milk."

The third experiment (11) was aimed at analyzing animistic thinking in brain-injured children. The children were asked whether man-made objects (chair, comb, etc.), natural events and objects (wind, clouds, etc.), and plants and animals were alive, whether they had the capacity for feeling or purposive action, etc. The brain-injured children attributed the characteristics of life and consciousness to inanimate objects more frequently than did the non-brain-injured. From the genetic point of view, the brain-injured children were inferior in the ability to classify objects with reference to life and consciousness.

B. AIM OF THE STUDY

Although it is true that the formation of conceptual relationships may occur on a non-verbal level, it is evident in the experiments just described that verbal factors play a significant rôle. Since this is so, two distinct explanations for the findings are conceivable. (a) Brain-injured children as a group are inferior in their formation of verbal conceptions. (b) The verbal concepts of these children are not inferior to non-brain-injured children but the anomaly observed emerges from psychopathologic conditions which alter normal thought processes.

Clinical and experimental observations have led to believe that the second hypothesis is the more tenable, i.e., the peculiar thinking process exhibited by brain-injured children is a function of dynamic factors rather than a retardation or an inferiority of verbal concept formation as such. One way of throwing light on the acceptability of the advocated hypothesis is to study the verbal conceptions of carefully matched brain-injured and non-brain-injured mentally deficient children. The results of such a study are presented in this paper. A special method of language analysis has been employed because none of the usual methods of analyzing concept formation (defini-

tions) seemed sufficiently refined for our purposes. This study, then, has a secondary aim which is methodological in nature. The method devised will be described in detail because it is felt that it may contribute to the development of psychological techniques adequate for any work dealing with the analysis of child language.

C. SUBJECTS

From the male population of the Wayne County Training School² 19 boys diagnosed as brain-injured were selected and matched in terms of chronological and mental age with 19 others diagnosed as non-brain-injured. At this institution all such diagnoses are made by the staff neurologist (6). Diagnosis of brain-injury is based on three criteria: (a) evidence from the developmental history of a prenatal, natal, or postnatal injury to the brain, (b) absence of feeble-mindedness in the immediate family, and (c) presence of neurological signs indicating a brain lesion. Children with signs of endocrine disturbances, syphilitic processes, and organic hereditary diseases are excluded from this category. On the other hand, a mentally deficient child is diagnosed as non-brain-injured (familial) if the development record and neurological examination are negative in regard to central nervous system lesions and if feeble-mindedness is evident in the immediate family history.

Because language growth is dependent on a multiplicity of conditions great care was exercised in matching the groups in several respects. Each member of a matched pair was within two mental age months and within five *IQ* points of the other (see Table 1).

TABLE 1
COMPARISON OF AGE AND INTELLIGENCE OF THE TWO GROUPS

	<i>CA</i>		<i>MA</i>		<i>IQ</i>	
	Range	Mean	Range	Mean	Range	Mean
Brain-injured	11-10 to 17-5	14-5	7-3 to 11-0	9-5	50-79	68
Non-brain-injured (familial)	11-11 to 16-1	14-0	7-4 to 10-11	9-4	55-78	69

The background of the children in both groups did not differ greatly in regard to socio-economic level. None of the children had a gross speech defect.

²The Wayne County Training School is an institution devoted to the training and rehabilitation of high grade mentally retarded children.

D. METHOD AND PROCEDURE

From Thorndike's list of 20,000 most frequently used words (9) nouns were selected which appeared appropriate for inclusion in a vocabulary test for mentally retarded children. Proper nouns, abstract words, and technical terms were excluded. A total of 265 words ranging over practically all of the frequency categories was chosen. For instance, 28 samples were taken from the first 500 words, i.e., from the 500 words of highest usage frequency (designated by Thorndike as *1a* words); 25 were from the second 500 words of highest frequency (*1b* words); 23 were from the third 500 words (*2a*), etc. The following is a complete list of the number of words selected from each frequency category.

28 from <i>1a</i>	7 from <i>5a</i>	4 from 12
25 from <i>1b</i>	17 from <i>5b</i>	4 from 13
23 from <i>2a</i>	17 from 6	5 from 14
19 from <i>2b</i>	20 from 7	0 from 15
8 from <i>3a</i>	17 from 8	3 from 16
9 from <i>3b</i>	10 from 9	4 from 17
17 from <i>4a</i>	9 from 10	3 from 18
7 from <i>4b</i>	9 from 11	1 from 19

For the purpose of constructing a vocabulary test it was desirable to select from the list between 50 and 60 words which would discriminate the children on the basis of chronological age. Therefore the 265 words were given as a vocabulary test to 21 boys varying widely in chronological age. Seven of the boys were among the youngest children at the school, their ages ranging from 8 years 11 months to 10 years 5 months with a mean of 9-11. Eight boys had intermediate ages ranging from 11-1 to 14-0 with a mean of 12-9. Six were representatives of our oldest children and had an age range from 14-8 to 16-4 with a mean of 15-9.

Three examiners administered the test in the same manner in which the Stanford Binet vocabulary test is given (8). The child was asked to tell what each word meant, the form of the question following this pattern: "*What is a —?*" or "*What do we mean by —?*" The subject was always asked "*to tell more*" when the response was vague or incomplete and was always encouraged to give the best possible answer to every question. All responses were recorded verbatim and were scored by both authors on the basis of correctness. Each response deemed acceptable was given a credit value of one.

In order to give the reader some idea of the scoring standards employed the following examples of acceptable responses are given. These particular

examples were chosen because they illustrate the ranges of qualitative variations within the limits of a correct response.

Horn

- (1) To blow.
- (2) From a cow; grows out of the head.
- (3) It's round; it's made of tin.
- (4) Something you blow on; it's used in some orchestras; have bass horn, bugles, etc.

Chain

- (1) Round pieces of iron attached together. Can use it for towing cars and things like that.
- (2) Use it in winter when you get stuck; chain is used on bridges.
- (3) They pull with chains.

Bridge

- (1) Made out of steel and got boards; where the cars go over; use it to cross rivers.
- (2) People walk over it; water runs under it.
- (3) What cars ride across.

Shadow

- (1) At night when the moon's out you can see your shadow; it's a black thing; when you move the shadow moves.
- (2) Like a person's shadow; follows you all over; it's a person's figure.
- (3) A black shadow, all dark; it's black and whenever you walk it follows you.

Tower

- (1) Big high building made out of bricks; go up winding stairs; a lighthouse is a tower.
- (2) Something which they have real big; got bells in it; singing song bells in it.
- (3) A high tower building.

Expert

- (1) One who knows how to do everything good.
- (2) Expert drawer, he could draw good.
- (3) When he draws some nice pictures and he has them framed.

Fog

- (1) All the damp moisture comes from the ground and settles in the air.
- (2) In the morning can't see nothing; like light rain.
- (3) Can't see any of the cottages or can't see the roads.

The 265 words were ordered according to the percentage of children passing each word. Some words were passed by all subjects, some were failed by all, and the rest were passed by varying proportions of the 21 boys. Fifty-seven words were chosen from this list to make up the final vocabulary list. The following considerations guided the selection and elimination procedures. (a) The final test should be appropriate in length, (b) it should

be suitable in range, and (c) it should be free from items which were shown to have a special connotation because of institution living.

The placement of each word in Thorndike's list is indicated by the number and letter designation in the first set of parenthesis and the percentage of 21 boys passing each item is given in the second set of parenthesis. *Horn*, for example, is followed by 1a and 100, the 1a indicating that this word is among the first 500 words in the Thorndike list and 100 meaning 100 per cent, showing that it was passed by all the boys examined. The list in its final form contained the following words:

- | | |
|---------------------------|--------------------------|
| 1. horn (1a) (100) | 30. suicide (13) (43) |
| 2. kite (1a) (100) | 31. amusement (5b) (43) |
| 3. bridge (1b) (100) | 32. cylinder (5b) (43) |
| 4. candle (1b) (100) | 33. scheme (4a) (38) |
| 5. lake (1b) (100) | 34. harbor (2b) (38) |
| 6. blossom (2a) (100) | 35. fluid (4b) (38) |
| 7. trap (2b) (100) | 36. evidence (3b) (34) |
| 8. cage (3b) (100) | 37. exception (4a) (24) |
| 9. ocean (1b) (95) | 38. luxury (3a) (19) |
| 10. city (1a) (95) | 39. caution (6) (19) |
| 11. rope (2b) (95) | 40. ailment (8) (19) |
| 12. chain (1b) (95) | 41. authority (2b) (14) |
| 13. sheet (2a) (95) | 42. harmony (3b) (14) |
| 14. accident (4a) (95) | 43. compliment (5b) (14) |
| 15. beach (2b) (86) | 44. drizzle (10) (10) |
| 16. shadow (2a) (86) | 45. resemblance (8) (10) |
| 17. servant (2a) (86) | 46. accuracy (8) (10) |
| 18. anchor (3b) (81) | 47. expedition (4a) (10) |
| 19. enemy (1b) (81) | 48. hospitality (7) (10) |
| 20. bubble (3a) (81) | 49. investment (7) (10) |
| 21. tower (2a) (76) | 50. frontier (6) (5) |
| 22. fog (4a) (76) | 51. gratitude (4a) (5) |
| 23. balcony (10) (58) | 52. illustration (6) (5) |
| 24. expert (4b) (53) | 53. descendant (7) (5) |
| 25. agreement (5a) (53) | 54. remedy (3a) (5) |
| 26. ceremony (4a) (48) | 55. resistance (7) (5) |
| 27. appointment (4b) (48) | 56. deception (9) (0) |
| 28. ancestor (4a) (48) | 57. portrait (9) (0) |
| 29. ornament (3a) (43) | |

The number of words taken from each of the Thorndike frequency categories is summarized in Table 2.

TABLE 2

Frequency category	No of words	Frequency category	No. of words
1a	3	5a	1
1b	6	5b	3
2a	5	6	3
2b	5	7	4
3a	4	8	3
3b	4	9	2
4a	8	10	2
4b	3	13	1

In the next tabulation the same words are distributed according to the percentage of 21 boys passing or making a plus score.

8 words passed by 100 per cent						
6	"	"	"	95	"	"
3	"	"	"	86	"	"
3	"	"	"	81	"	"
2	"	"	"	76	"	"
1	"	"	"	58	"	"
2	"	"	"	53	"	"
3	"	"	"	48	"	"
4	"	"	"	43	"	"
3	"	"	"	38	"	"
1	"	"	"	34	"	"
1	"	"	"	24	"	"
3	"	"	"	19	"	"
3	"	"	"	14	"	"
6	"	"	"	10	"	"
6	"	"	"	5	"	"
2	"	"	"	0	"	"

The final vocabulary test was given to the two matched groups, brain-injured and non-brain-injured mentally deficient children, in the same manner used in the preliminary word analysis. Every child was asked to define each of the 57 words. After the first response was given the subject was always asked to "tell me more about the word."

E. TREATMENT OF DATA AND RESULTS

1. *Quantitative Analysis*

Each definition was evaluated as to correctness according to the same standards described in the preliminary part of the experiment; an item was marked plus and given a score value of one if the child showed some acceptable concept of the meaning of the word. A total score consisting of the

sum of correct responses was obtained for each subject and mean group scores were as follows:

Brain-injured	28.68
Non-brain-injured	25.79

These averages may be called the "gross scores." Since the 13 words defined correctly by all the children had to be considered too easy and therefore of no significance for differentiating the two groups, they were omitted from the final calculation. Hence a reduced "differential score" was obtained for each group consisting of the sums of correct responses to the remaining words. The mean "differential scores" are:

Brain-injured	15.68	<i>SD</i> 5.36
Non-brain-injured	12.79	<i>SD</i> 3.41

Since we are dealing with two small groups matched on Revised Stanford-Binet mental ages and *IQ*'s the significance of the difference between the mean (2.89) has been determined by the formula for *t* which pertains to related measures (5). The value for *t* was found to be 2.25 which indicates that the mean difference between vocabulary scores is statistically significant at the 3 per cent level. The hypothesis that brain-injured children have a wider vocabulary range than non-brain-injured children may be accepted with some degree of confidence.

Figure 1 presents graphically the performance of the two groups with respect to the single words. The numbers on the graph refer to the words listed on pages 8 and 9. It will be recalled that these items are ordered according to difficulty as shown by the preliminary analysis on 21 boys. The

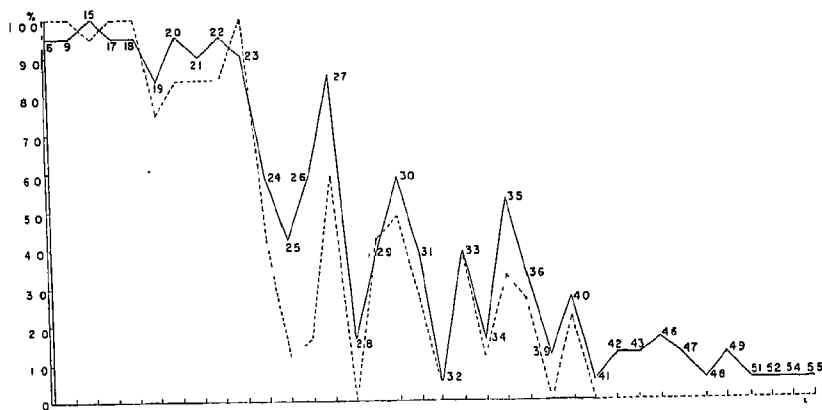


FIGURE 1

percentage values on the ordinate refer to the proportion of children in each group making plus scores. To shorten the graph, words which were known by all children (the 100 per cent words) and those not known by any (the 0 per cent words) were omitted. It can be seen that there is a fair relationship between the performance of the preliminary group and the two experimental groups, i.e., none of the words that were easy for the preliminary group were found to be difficult for the experimental groups or vice versa. A further inspection of the graph reveals that on most of the words the brain-injured children's scores were higher and that in general this group had a more extensive upper range.

To sum up: Children of the generally retarded type (non-brain-injured) were found to be quantitatively limited in their knowledge of verbal concepts as compared to brain-injured mentally deficient children. This finding is evidence which verifies clinical observations.

2. *Qualitative Analysis I—Evaluation of Goodness of Definitions*

* According to our quantitative analysis, brain-injured children were superior to non-brain-injured children in number of words correctly defined or extent of vocabulary. It was also of interest to learn whether the groups might be further differentiated by the quality of the definitions which were accepted as correct. As an approach to this problem we selected the words, 21 in all, which were defined correctly by all or nearly all of the children in the two groups. Each response was copied on a separate slip of paper. All the definitions for each word were given to five judges who evaluated them on a five-point rating scale. These instructions were given to each judge:

All the definitions given in a pack have been accepted as correct. We are interested in discerning the qualitative differences between them.

Will you please order the definitions in each pack into five groups? The definitions you consider to be best place in Group 1; those you consider most inferior place in Group 5 and those of intermediate goodness, place in Group 3. Definitions that fall between these values are in Groups 2 and 4 depending whether they are above or below the intermediate group.

The terms "best," "most inferior," and "intermediate" are to be considered in a relative sense, i.e., in respect to all the definitions offered for a given word. It would be best, therefore, to spread all the definitions out on a table, look them over carefully and then order them into the five groups.

After your judgments have been made record them on the record sheet.

A qualitative rating which was the mean of the mean ratings assigned

TABLE 3
MEAN QUALITATIVE SCORES AND DIFFERENCES FOR EACH PAIR OF MATCHED SUBJECTS

Pair	Brain-injured	Non-brain injured	Difference
1	31.37	39.90	8.50
2	34.54	39.90	5.36
3	35.41	39.90	4.49
4	34.18	36.03	1.90
5	38.54	31.87	-6.70
6	35.85	37.55	1.70
7	30.59	23.80	-6.79
8	36.38	23.80	-2.58
9	31.15	23.80	-7.35
10	35.96	34.61	-1.35
11	24.73	35.85	11.12
12	36.27	33.47	-2.81
13	27.52	33.46	5.94
14	29.74	33.46	3.72
15	35.39	36.09	.70
16	30.30	31.28	.98
17	28.76	34.76	6.00
18	28.25	29.26	1.01
19	29.48	30.80	1.32
Mean	32.34	33.61	1.27

to each definition was derived for each child. Table 3 presents the scores (average rating value multiplied by 10) for the 19 matched pairs. Since a rating of one was the highest possible score and a rating of five the lowest possible score, the lower the mean score the higher the ascribed qualitative rating. In 13 of the 19 pairs, the brain-injured member has a better qualitative rating or a lower total score. Although there seems to be a trend showing that brain-injured children have higher qualitative ratings the difference between group means is not statistically significant according to Fisher's t test ($t=1.607$ and $p=.30$).

3. Qualitative Analysis II: Modes of Definition

There are several ways to analyze quality of definitions. One method is to examine each correct response to learn what form or mode was used to express the meaning of the word. After several preliminary inspections it seemed most feasible to classify all the responses into seven mode categories. These various ways of defining a word are briefly enumerated and illustrated.

a. How made. Definition is a description of how the object is made or constructed.

Examples: *Bubble*—"Take water and soap and blow in it"

Kite—"You make them with sticks and paper."

b. Function. Definition is in terms of use. The child describes how and for what purpose an object is used.

Examples: *Horn*—"What you blow."

Cage—"Where you keep animals."

c. Situation. Definition is in terms of the concrete situation in which it is found or in terms of concrete events.

Examples: *Beach*—"People have picnics, play in sand."

City—"People drive around and buy things."

d. Localization. Definition is in terms of the definite place in which the object is found.

Examples: *Tower*—"It's in a big city. I saw one in Detroit."

Beach—"It's on a river."

e. Properties—independent. Definition enumerates characteristics of the object such as color, size, texture, material, etc.

Examples: *Ocean*—"A big, big deep hole, full of water."

Cage—"A square thing with iron rods."

f. Properties—interrelational. Definition describes dynamic characteristics of the object. Such characteristics are referred to as interrelational because they are brought out with respect to the elements of the situation.

Examples: *Blossom*—"It grows out of a bud."

Shadow—"It follows you on the sidewalk."

Fog—"It covers up things; can't see through it."

g. Class concept and metaphor. Definition is in terms of the general class to which it belongs or is likened to another concept.

Examples: *Lake*—"It's like a big river."

Tower—"It's a big building."

Approximately one-half of the definitions contained two or more modes of expression. Illustrations of responses catalogued under more than one category follow:

Horn—"There are two kinds of horns, one kind you play on (use); a a musical horn" (class concept).

Candle—"When people had no light and they used candles (function); it's wax (property—independent); make them with a string put in wax" (how made).

Cage—"Use them for animals (function) at the zoo (localization); has bars on it (property—independent); put tigers and lions in it" (function).

Blossom—"Flower (class-concept); when first opening up; grows bigger and soon have whole flower" (property—interrelational).

Lake—"Big deep hole (property—-independent); fish, crabs, live in it, boats go on it (situation); you can swim in it" (function).

Kite—"You can fly it (function); you buy it at the store" (localization).

Beach—"Where they lie in sand (function) and have big umbrellas and sit down and read papers" (situation).

Bridge—"It's over water (localization) and cars can go over it" (function).

Shadow—"It's dark (property—independent); the reflection of a person on 'the sidewalk'" (property—interrelational).

One part of the analysis concerned the question as to whether a difference could be found between the two groups with regard to the *number of modes employed* in the definitions. As stated above, in about half of the definitions only one mode was used, the other half contained more than one of the seven categories. For each group the number of definitions containing one, two, and more than two modes were tabulated separately. The results of this tabulation appear in Table 4.

TABLE 4
NUMBER OF MODES INCLUDED IN DEFINITIONS

	One mode	Two modes	More than two modes
Brain-injured	168	195	17
Non-brain-injured	211	155	18

There is a difference between the two groups with regard to the complexity of definitions. The familial children used the one-mode type of definition more frequently than the brain-injured group. Two-hundred-eleven definitions or 55.0 per cent of the responses of non-brain-injured children contained only one mode compared to 168 definitions or 44 per cent for brain-injured children. In other words the non-brain-injured mentally deficient chose predominantly a homogeneous, simple form of definitions, the brain-injured predominantly a complex form. These differences, according to the Chi-square test, are statistically significant at the one per cent level.

In a further analysis the *frequency of occurrence of each of the seven modes* of definition was computed separately for the brain-injured and familial groups. The results of this analysis are presented in Table 5. It is immediately apparent that the children in both groups most frequently resorted to defining words in terms of function (use) or independent properties of the things for which they stand. The two groups differ clearly in the frequency of these two modes. The non-brain-injured used the mode of func-

TABLE 5
OCCURRENCE FREQUENCY OF THE VARIOUS MODES OF DEFINITIONS

	How made	Func.	Sit	Loc.	Prop. ind.	Prop. inter.	Class	Total
B-I Absolute No.	18	251	31	50	163	56	40	609
Per cent	3	41	5	8	27	9	7	100
Non-B-I Absolute No.	21	317	43	39	88	41	42	591
Per cent	4	53	7	6	15	8	7	100

tion more frequently than the brain-injured children. The mode of function or use appeared 251 times in the responses of the brain-injured subjects and 317 times in the non-brain-injured children, or in terms of percentages, 41 per cent of the total tabulated responses of the brain-injured group had functional elements compared to 53 per cent for the non-brain-injured children. On the other hand, independent property elements show the reverse trend: There are 163 or 27 per cent of the total number of responses in brain-injured children that may be so classified, as against 88 or 15 per cent in non-brain injured. In brief, brain-injured children were more inclined to define words in terms of their independent properties while children of the familial type were more prone to state word meanings in terms of function or use. The Chi-square test of homogeneity shows that these differences are statistically significant at the one per cent level of confidence.

F. DISCUSSION

Previous studies comparing brain-injured and non-brain-injured children have demonstrated that brain-injured subjects show disturbances in the formation of conceptual relations. Such findings pose a question as to whether brain-injured children are impaired in their concept formation *per se*, or whether the anomaly emerges from other conditions which alter normal thought processes. Clinical observations indicate that the second possibility is more tenable for the concepts of brain-injured children have appeared to be superior rather than inferior to non-brain-injured children. Present results confirm this point of view. The analysis of concepts employed in defining words showed that the brain-injured subjects were superior to the non-brain-injured by (a) the greater range of words correctly defined, (b) the qualitative superiority of definitions, (c) the greater variety of modes employed in formulating definitions, and (d) the relatively infrequent appearance of definitions in terms of use—a primitive method of expression according to findings in genetic psychology.

These findings and conclusions may be integrated with an interpretation of the thinking of brain-injured children in various conceptual tests.

As mentioned in the introduction, brain-injured children describe everyday events more animistically than non-brain-injured children of comparable mental ages. Since the present study shows that the verbal concept formation of brain-injured children is not retarded one must look for an explanation for the greater animistic behavior in the pathologic personality structure of these subjects (11).

A theoretical explanation of the relation between the results of the present study and those involving the various grouping experiments is extremely complex. One way of interpreting our results is this: Verbal concepts play an important part in the performance of sorting tests. The picture-object test, for instance, cannot be performed on a purely perceptual level. The child sometimes thinks silently, sometimes aloud; he reasons with himself as to why to put one object into the picture, why to discard another. If the brain-injured child were inferior in the understanding of the meaning of the various objects the interpretation of his peculiar behavior on the test could be based on an impairment of concept formation as such. The results of the present study contradict such an interpretation. It is possible, however, to link the results of the vocabulary test and the grouping tests in another way. We may refer for such an interpretation to the findings and points of view of the psychopathologists Head (4) and Goldstein (1, 2). If confronted with the task of grouping, says Goldstein, "we are oriented by a conceptual point of view, be it the conception of a category, a class, or a general meaning under which the particular object before us falls." This power of abstraction or conceptualization is neither specifically verbal nor is it specifically perceptual. Any loss in "abstract behavior is reflected in language as well as in imaginative and perceptual activity." Goldstein has demonstrated cases of aphasia in which the impairment is that of abstract conceptualization rather than that of a language disturbance proper. And characteristically those patients show the impairment on the language level as well as on perceptual tests of sorting or grouping objects.

According to Goldstein's point of view any impairment of concept formation as such would become apparent in both verbal and perceptual tests. It is certainly true that with reference to normal subjects of the same chronological age our brain-injured children are retarded in verbal concepts. The question is, then, whether the impairment expressing itself in the verbal field is such as would affect the grouping or sorting behavior in the way described earlier. This question can be answered in the negative since the

non-brain-injured children showing an even greater retardation in verbal concepts gave no evidence of the disturbance of grouping behavior. We may therefore conclude that an impairment in the function of building and understanding concepts in itself cannot account for the peculiarities in brain-injured children.

Findings from the various grouping experiments are in support of our conclusions that the *pathological dynamism* rather than a primary impairment of the concept formation is the cause of the disturbance of conceptual thinking. Many of the brain-injured children giving atypical performances will present acceptable solutions if the examiner succeeds, by adequate questions, in instigating a critical attitude. The abnormal reactions become more noticeable as the variety of the material is increased as if unleashing an unrestricted flow of associations. Some of the children behaving adequately at the beginning show greater frequency of peculiarities in their thinking as the experiment proceeds and as they become more excited and exhausted from an increasing assortment of material. In other words, the more the thinking of the brain-injured child is channelized due to a restricted test situation the less apparent are the abnormal reactions. On the other hand, the freer the situation and the more elements there are in it, the more likely it is to provoke irradiating associations and other abnormal processes.

The interpretation above is well illustrated by the behavior of one of our cases. F.B. is a 16 year-old boy having an *IQ* of 80 and displaying various neurological signs attesting to a brain-injury. His achievement in the academic school subjects is quite high and in accordance with his mental age. His knowledge of verbal concepts is excellent; he scored one and one-half years above his mental age on the Binet vocabulary test. He knows and defines a great number of abstract words. However, his achievement on the various grouping tests ranks with that of the mentally youngest members of the experimental brain-injured group. On the picture-object test in which objects related to the picture of a drowning boy had to be placed logically, he selected a multicolored ball with the explanation: "*That ball belongs to the boy; it is just floating on the water.*" One of his teachers describes the incongruities in his performances most aptly. She says: "This boy has the distinction of being one of the highest grade and one of the least capable or efficient. He is interested in all sorts of books and acquires an inordinate amount of information which he never applies in a practical way." This boy's discrepancies bring into clear relief the problem and the conclusions of the present study. These children are quite capable of understanding and building isolated concepts and conceptual knowledge; they appear disturbed

whenever, in free situations, abnormal processes emerge which impede the full use of their capabilities.

G. SUMMARY

In a series of studies—most of them involving some type of sorting technique—brain-injured mentally retarded children have been shown to be impaired in the formation of conceptual relationships. In order to study the problem as to whether or not retarded concept formation *per se* is the major causal factor, verbal concepts given in response to a specially constructed vocabulary test were analyzed. The subjects consisted of 19 non-brain-injured (control group) and 19 brain-injured mentally deficient children matched on their Stanford-Binet *MA*'s and *IQ*'s.

The definitions of the brain-injured children were found to be superior both qualitatively and quantitatively. The brain-injured subjects had a wider vocabulary range; they employed more advanced modes of expression, and they gave more detailed and complete meanings to the terms defined.

Theoretical implications of the findings are discussed. It is contended that the disturbance in conceptual relationships as found in grouping and sorting tests was due not to an inferiority of the concept formation as such but rather was caused by dynamic factors of a presumably pathological origin.

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THE EFFECT OF SCHOOLING UPON THE RELATIONSHIP BETWEEN CLERICAL APTITUDE AND INTERESTS

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A. INTRODUCTION

In an earlier paper this writer (12) presented data obtained by administering clerical interest and aptitude tests to the same students before and after a year of schooling. He stated that the data could be used to answer two problems: "(a) will the test scores for clerical aptitude and interests be the same after schooling as before, and (b) will the relationship between interests and aptitude remain the same after a year of schooling as before?" The above article attempted to give some answer to the first question and this paper shall try to answer the second one.

The problem of the relationship between abilities, capacities, aptitudes (the three terms have been used interchangeably in the past), and interests (both claimed and measured) is not a new one. Points of view have ranged from a belief in high relationship through low correlation to mere chance relationship. Examples of the first viewpoint may be found in the claims of Thorndike (18, p. 179) and Woodworth (21, p. 74). In contrast to these opinions are those of investigators who have found practically no connection between the two traits. Among those who maintain with Fryer (6, pp. 209-211) that "interests and abilities are different qualities of mental life. Neither one is dependent upon the other. . . ." are Viteles (19, pp. 139-140), Kitson (11), Cowdery (3), Ream (14), Craig (4), Freyd (5), and Garretson (7). A middle-of-the-road point of view is expressed by no less an authority than Bingham (2, p. 61), who writes: "It is known that there is some relationship—although the connection is far from close—between interests and abilities." Williamson (20, pp. 450-453) speaks of the presence of "low correlations between the two" and some other workers who have found low relationship are Hartman and Dashiell (9), Kornhauser (13), Remmers (15), Hubbard (10), and Strong (16).

So far as this writer knows, no study exists in which the same group was tested for the two traits both before and after a period of schooling or training. That there is a need for this type of investigation is indicated by

Fryer's criticism (6, pp. 213-214) of Strong's study (16) and that of Cowdery (3). Writes Fryer:

The investigations into training as a cause of interests are unsatisfactory. Neither of the two studies bearing upon the problem follows one group throughout its development. If it were found that individuals developed more and more interests in their profession as they advanced in training, and increased accordingly their professional score in the inventory, these facts would argue for the influence of training upon interests. Strong's figures suggest this condition, although the three professional levels are represented by three different groups.

(Strong had found that the higher the professional level of engineers the higher the interest score.)

B. PURPOSE

In line with Fryer's suggestion, the present study followed a group of 207 students who had been subjected to a year of clerical training (in a public vocational high school) by obtaining interest and aptitude scores before and after that year of schooling. In view of the above discussion, the purpose of this article may be said to be the determination of the relationship between clerical aptitude and interests before and after schooling in order to note the effects, if any, of that schooling upon the relationship.

C. THE TESTS

The tests employed for this study were the name checking and number checking parts of the Minnesota Vocational Test for Clerical Workers by Andrew and Paterson (1) and the General Office Worker and Stenographer-Secretary scores of the Vocational Interest Blank for Women by Strong (17).

D. STATISTICAL TREATMENT

Product-moment correlations were found between test scores for (a) Number Checking and General Office Worker, (b) Number Checking and Stenographer-Secretary, (c) Name Checking and General Office Worker, and (d) Name Checking and Stenographer-Secretary. These correlations were found for the 1939 results and again for the 1940 results. The reliability of the differences of the obtained coefficients for each of the pairings was determined by the formula $PE(r_1 - r_2)$ described by Garrett (8, pp. 281-283). It must be mentioned that this formula is intended for r 's calculated from different samples. However, for a situation of the type presented here, "it will give results which may be approximately correct." The results appear in Table 1. (For other pertinent data the reader is referred to the earlier article, 12).

TABLE 1
RELATIONSHIP BETWEEN INTERESTS AND APTITUDES

	1939	1940	$PE(r_1-r_2)$
Number Checking and General Officer Worker	.086*	.136	.77
Number Checking and Stenographer-Secretary	.064	.093	.45
Name Checking and General Office Worker	.001	.004	.05
Name Checking and Stenographer-Secretary	.221	.182	.62

**All PE 's between .044 and .047.

E. THE RESULTS

The first thing to note in Table 1 is that in all instances the reliability of the differences was not significant—ranging from only .05 to .77 when 4.50 is necessary to indicate reliable difference. A second matter to note is the size of the coefficients. In only one instance is there a coefficient of more than .20; namely, Name Checking and Stenographer-Secretary. Attention must also be called to the fact that the coefficients of correlation are so low that in every case but one the r is not significant in that it is not four times its probable error.

F. CONCLUSIONS

The conclusion which may be reached from these results can be stated as follows: A year of schooling had no tendency to improve the negligible relationship which existed between clerical interest and aptitude test scores before that period of schooling.

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SHORT ARTICLES AND NOTES

The Journal of Genetic Psychology, 1945, 66, 259-265

CASE HISTORY OF A SO-CALLED IDIOT-SAVANT*¹

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A. INTRODUCTION

"Idiot-Savant" is a paradoxical term and subject to suspicion for that reason alone. Writers (2) have called attention to the fact that many such cases have not been fully authenticated by people competent to make a scientific investigation. Other cases on closer investigation give the appearance of exaggeration of some special talent along with underrating of other abilities so that the true picture of the case has been presented in a distorted light. The case to be presented in this paper is one which appeared remarkable to the writer on first acquaintance and which developed a number of interesting features during the course of the observations.

As first introduced to the writer, the patient was described as a person who was able to name the day of the week for any date from 1915 to the present time. Since he was classified as a helpless idiot, this seemed to be an ability which merited investigation. The patient, in fact, has no language responses at all, and so far as the writer can learn, never did have. He gave his answers to the questions regarding the day of the week by nodding or shaking his head when the questioner asked "Is it Monday, Tuesday, etc."

B. PRELIMINARY EXPERIMENT

The writer drew at random 10 dates within the period which the patient was said to be able to cover. In addition to this, he added two dates, one each in the next two years. Of these 12 dates, the patient responded correctly to 10 of them and when asked to try again on the two that he missed, his answers were correct. Since at one time the experimenter had believed that the patient might be getting cues from his questioner, the day of the week of each of the dates used was not known by the experimenter until the response had been recorded. In addition to these dates, the experimenter has also recorded 14 times in which the patient has told visitors the day of

*Received in the Editorial Office on September 18, 1943.

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the week on which their birthdays occurred. Thus there was no doubt of his ability to perform this feat with only occasional error.

C. MEDICAL HISTORY

University Hospital, May 31, 1923. (2nd paragraph of letter dated 2-20-33.)

"Our examination showed the child to be well nourished. He was unable to sit up alone, was unable to talk, and his hands were moving continuously in aimless fashion. Our impression at that time was that of idiocy and we had nothing to recommend in the way of treatment. This probably followed an encephalitis which occurred at six months of age. Blood wasserman was negative." *D. Murray Cowie, M.D.*

Sigma Gamma Clinic & Convalescent Home for Crippled Children. (Letter dated 2-8-33.)

11-6-30. "Quadriplegic spastic with a great deal of athetosis and obvious impairment. Do not believe orthopedic care at this clinic is indicated. Referred case to Dr. Schreiber, Neuro-surgical clinic, Harper Hospital, for preliminary status."

Dr. Schreiber corroborated impression of congenital cerebral atrophy as follows:

"The R—— boy is a hopeless idiot and I do not consider it worthwhile to spend time or effort on him in an effort to teach him how to walk. He should be institutionalized. The encephalograms in his case showed an entire absence of the cortical markings over his fronto-parietal region—the appearance is like that found in adhesive arachnoiditis. There are fewer convolutional markings over the occipital lobes and the fissures are abnormally deep. The posterior horn length is increased, which is a usual finding in this type of idiot. There is a patchy distribution of air over the frontal lobes showing pathology also. There is some asymmetry of the ventricles."

Presented at Staff 10-9-33, Lapeer State Home and Training School.

"B—— tests psychometrically in the idiot class. The history shows that this boy was seriously injured at birth, but also states that his symptoms cleared and that up to six months he seemed normal, but at this time had 'infantile paralysis' accompanied by convulsions. Following this he was unable to hold his head up and his arms and legs seemed weak and helpless. Neurologically he shows nothing that would lead one to think that he ever had infantile paralysis, but he might have had cerebrospinal meningitis. I think the case should be left undifferentiated: Post Traumatic Mental Deficiency, Natal Post-infectious Mental Deficiency, Cerebro-Spinal Meningitis. Recommendation: Custodial Care." *H. A. S.*

D. FAMILY HISTORY AND PRESENT BEHAVIOR

The patient was born on February 8, 1916, of Italian born American citizens. His father is a shoemaker. His mother deserted the family in 1932, at which time he was committed to the State institution. He has three brothers, who appear to be within normal limits of intelligence, as determined by average attainment in the public schools. So far as can be determined, no relatives of the patient have been known to other State Hospitals or social agencies.

The patient spends his time in the bed, in a wheel-chair, or on the floor when he gets tired of the other two. He must be moved from one place to the other by other people although he is able to manipulate the wheels of his chair in a forward direction by use of the toes and in a backward direction by use of his hands. These movements are very difficult and slow. He weighs 100 pounds, has dark skin, black eyes and black hair. His face has a pleasant expression when not distorted by spastic grimaces. He communicates his desires by grunts and gestures, many of which are rather wild and uncontrollable because of his spasticity. The nearest approach to speech which the writer has heard was the sound "Buh" for bottle. The chief constituent of his food is milk. Attendants, who are accustomed to him can interpret his signs readily. He easily makes known when he wants a drink or has other bodily needs. If he wants his radio off or on he points toward it and grunts. He is able to tell time.

He listens to the radio a great deal, particularly to the Detroit Tigers' ball games. He likes to bet on the games with attendants and other employees of the institution. He signifies his desire for a bet with a broad grin and holding out his hand for acceptance of the bet. These bets are usually a bar of candy and it is not on record that he has ever paid off when he lost. He was the only person in the hospital who picked the last World Series winner.

Intercourse is maintained by asking questions which must be phrased so that they can be answered by "yes" or "no." The "no" responses become vestigial—a movement of the right side of his upper lip. However, there is no mistaking the smile which accompanies the "yes" response—a smile which says one has finally asked the right question. He knows his own age and date of birth and is correctly oriented to time and place.

E. PSYCHOMETRIC (9-26-33, *CA* 17-7, *MA* 1-6, *IQ* 8)

"Discussion of Tests: The basal age is established on the Kuhlmann test at the six-month level, and further successes range through the twelfth, eighteenth, and twenty-fourth months, and three years on the

Binet test. The only failure at the twelfth month is speech. The patient cannot say anything and makes guttural sounds. At the eighteenth month, he is able to drink water from a cup, but he cannot feed himself because he has practically no control over the use of his hands. Speech is again failed, but he recognizes objects in pictures. At year II he points out objects in pictures and is given credit for imitating simple movements. Simple commands are failed as well as copying the circle and removing wrapping from food before eating it. He tries to put the candy into his mouth without unwrapping it. At year III, he was able to point to his nose, eyes, mouth, and hair. The remaining parts of the test were not given because they involved speech" Mary E. Halligan.

1. *Attempts at Psychometric Measurement*

Due to his handicaps, it was of course impossible to give any standardized test in the standardized manner. A number of test items were tried from the Stanford-Binet, Form *L*, to see how much comprehension he had. The vocabulary was presented by asking the usual questions, then giving definitions to which he could respond "yes" or "no." For this purpose, the test was made into multiple choice items, using the minus responses given in the instruction manual as the false responses. Under this procedure, he showed comprehension of seven words in the list. These words were: orange, envelope, straw, gown, haste, juggler, brunette. Presenting other questions in similar manner, he passed number concepts at Year VI, making change at Year IX, and the second of the three problems at the Average Adult level. The highest item passed was orientation at Year XIV. He is able to retain five digits forward and four digits backward.

On the Massachusetts School Test, he passed all arithmetic problems at the second year level. He is not able to add nor multiply when two digits are involved in the calculations. He does not read.

Two parts of the Grace Arthur Scale were tried, the Knox Cubes and The Healy Picture Completion I, the latter without time limit. Six of the Knox Cubes items were successful on each of the first and second trials. This performance is at the VI year level on the Arthur norms. The blocks of the Healy Completion were found by first identifying the row and then running down the row until the patient indicated which one of the blocks was to be used for a particular place in the board. The score on this item was just below the VI year level.

2. *Later Experiments*

The experimenter now proceeded to attempt to determine the method which this young man was using to determine the days of the week. Questioned directly, he was at first unwilling to reveal his methods, probably

because of the prestige which this trick gives him in the institution. It is his one claim to distinction, and he can scarcely be blamed for wanting to keep his "trade secret." However, when the purpose of the experimenter was explained to him, he agreed to coöperate. By that time, it was known that he was not securing cues from the questioner, although he can do so if the questioner is not exceedingly careful to guard himself against revealing the correct answers. It was obvious from the arithmetic test, that he did not have a sufficient knowledge of arithmetic to perform this feat by formula. However, it was noted early in the procedure that the patient fixated his gaze on the ceiling before attempting to give his responses. A visual imagery of eidetic character seemed a reasonable assumption and a series of tests were arranged to test this assumption.

A series of pictures in a children's work book entitled *Learning to Count* (written by Eleanor T. Pratt and illustrated by Lee D. Tessin) were presented to the patient for periods of 15 to 30 seconds each. These pictures were chosen because of their quantitative nature. For purposes of comparison, four other subjects were tested in the same manner. Two of these were Departmental Assistants, with masters' degrees in Psychology. The other two were children of superior ability, ages nine and eleven with Stanford-Binet *IQ*'s of 141 and 139 respectively. Of the 57 questions asked concerning the pictures, including numbers of various items and also colors, the patient answered 68 per cent of these questions correctly, the Psychologists 47 and 43 per cent, and the two children, 55 and 60 per cent respectively. Tested six months later on one of these pictures, the patient gave five correct responses out of six. The same wrong response was given when first tested. The other subjects of the experiment claimed that they could not remember any of the details of the picture.

One attempted experiment gave rather inconclusive results. A rectangle, 7 x 8 inches was divided into 56 one-inch squares and the digits one to nine were placed in them in random order. The patient was permitted to study this for 15 minutes. Six months later, he was asked to recall the digits. His responses were only slightly better than chance. This leads one to think, that while eidetic imagery is playing a large part in giving him his responses, the consecutive nature of the dates on the calendar is also an aid. This particular problem seems to have been a little too complex for him.

A calendar for the month of February, 1920, was made without the year being placed on it. The patient was asked to identify the year in which this month occurred. This he was able to do. He was asked at one time

to determine the day of the week of November 27, 1930. He responded correctly that it was Thursday. He was then asked if the number were black or red, and responded "yes" to red. This gave a suggestion for an additional experiment.²

A calendar for the year 1945 was prepared. This year was chosen because he already knows 1944. Three colors were used in preparing this calendar, red, green, and black, and the dates were given the various colors at random. The patient was given this calendar on Wednesday and tested on the following Friday. He studied the calendar altogether for about 2½ hours. Twelve dates were chosen at random and he was asked on the first of these what day of the week it was. His answer was correct. Then he was asked what color it was. He appeared startled and gave an incorrect answer. The experimenter asked him to look at it again. He fixated his eyes on the ceiling and gave the correct response. On the remaining 11 questions, only one was answered incorrectly and the correct answer was obtained on a second trial. In all of these he fixated his gaze on the ceiling before responding.

F. DISCUSSION

The case presented here gives on first appearance the impression of a thought process on a level superior to other thought processes—the type of phenomenon which gives rise to the term idiot-savant. This seems particularly true in the light of the previously determined mental age of one year and six months and *IQ* of 8. The writer has no particular quarrel with these test results as representative of the patient's functional level, for actually a child of one and a half years can do many things for himself that this patient cannot. However, in spite of the fact that he is a seriously damaged organism, he has developed a number of thought processes to the level found among children six to nine years of age—vocabulary (comprehension), digit memory span, some arithmetic fundamentals, etc.

The accumulated evidence points quite strangely toward eidetic imagery as an important factor in his day-naming ability. With this particular tool and other demonstrated abilities of a higher order than his level of social functioning, the writer finds nothing in this case to warrant the supposition that this patient does not conform to the hypothesis of Hull (1) that an individual's traits tend to group themselves about his own average and do not vary greatly therefrom.

²The writer is indebted to Professor M. R. Hunt, Michigan State College, for this idea.

The fact that eidetic imagery is usually found in the pre-adolescent years (3) and is seldom carried into the adult years calls for an interpretative suggestion. It is possible that this trait recedes with the process of growing up because of an over supply of visual images and the acquisition of other means of retention (principally language) as well as possible bio-chemical changes. This patient, limited both in the number of visual experiences and in the acquisition of language, may have thus retained eidetic imagery into his adult life through continued use and because of its usefulness to him.

G. SUMMARY

This is the case of a quadraplegic spastic whose pneumoencephalogram shows considerable deviation from the normal. He is unable to walk, talk, or care for his own needs. However, he shows the comprehension of a child between six and nine years of age and is able to communicate his ideas by answering questions. His outstanding ability, naming the day of the week of any date since 1915, definitely appears to depend upon eidetic imagery, and is not sufficiently superior to other abilities to warrant the use of the term idiot-savant.

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PRENATAL AND EARLY DEVELOPMENTAL HISTORY OF 136 DELINQUENTS*

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There is general agreement in the psychiatric and mental hygiene field that the earliest years of the child's life are of tremendous significance in setting the pattern of the child's personality and modes of adjustments to life situations. Since the roots of much of the child's behavior can be traced back to the child's earliest years and even as far back as the early attitudes and health of the parents prior to the birth of the infant, an investigation of the available data covering this early period was made in a study of delinquents handled by the Passaic Children's Bureau over a period of the past five years. The data studied included: planned or accidental birth; health of mother during pregnancy; ease of delivery; birth weight; feeding; age of teething, weaning, sitting, and talking. This information was had on some 133 cases which is a fifth of all cases handled by the Children's Bureau since its opening.

A. PLANNED OR ACCIDENTAL BIRTH

Information was available on 103 cases in which the parent, usually the mother, answered to the question, whether or not the child had been planned for or whether it represented an accidental birth. Eighty-four per cent of the 103 parents stated that the child was not planned for. The heavy weight of the cases in the direction of children who, in all likelihood, might not have been wanted and who usually, through their arrival, merely complicated an already complicated home situation, might well result in early rejection, dislike, and subconscious resentment and hate. Much of the data on the family relationship, size of family, and economic background uncovered on this group would tend to support this interpretation. Menninger (6) stresses the importance of this point of view:

Consider the great masses of people on the plains of China, or in the slums of New York, or in the prisons of every state in the Union, and ask yourself how many of these people were the deliberate and considered product of their parents' love. How many of these struggling units of society were the children of parents who planned for

*Received in the Editorial Office on October 11, 1943.

them and hoped for them and waited for them with a greeting of joy and welcome? How many of them were the children of parents who produced them only by accident, who resented their conception and dreaded their arrival, consciously or unconsciously hating their existence because it threatened their own and took from the mouths of an already frantic and miserable family? And what are the psychological consequences to the child of being unwanted and unwelcomed—of being looked upon by its parents as a punishment for indulgence in a sin?

When we consider the large number of unplanned births in the light of supporting evidence—the very large families, the very crowded living conditions, the inadequate physical surroundings, the low economic standard of living and the working mothers which characterized this group, we picture the delinquent as an uninvited guest entering a home where his very arrival tends to jeopardize the prestige and the favors being received by all other members of the family, if not their very existence.

B. HEALTH OF MOTHER DURING PREGNANCY

In view of the fact that the mother, while she is carrying the baby, may go through more than the usual amount of discomfort and thus acquire and attain undesirable emotional attitudes toward the unborn child, leading consciously or subconsciously to rejection and dislike, a check was made of the health of the mothers during the pregnancy period, according to available data. The mothers of 136 delinquents had described their condition during pregnancy. The data were checked and the mothers' physical condition evaluated as "good," "fair," or "poor." Eighty-two per cent of the mothers reported themselves in "good health." The remainder, 16 per cent, reported themselves in "fair health" and only 2 per cent reported "poor health." Apparently mothers of most delinquents upon whom information was available were in good health and might be said to have little physical reasons, other than the usual discomforts associated with pregnancy, to attach a feeling of dislike for the unborn child.

C. EASE OF DELIVERY

Reports of 127 mothers as to the ease of delivery of the child delinquent were available. Of this number 107 or 84 per cent stated that the delivery was a normal one. Only 16 per cent reported premature or difficult deliveries. It is interesting to note that these percentages closely resemble the data reporting health of the mothers during pregnancy. Apparently only a

few of the mothers of the delinquents recalled the period of their child's birth with physical concomitants of extraordinary pain or difficulty.

TABLE 1
MEAN DEVELOPMENTAL AGES OF PASSAIC DELINQUENTS AS COMPARED WITH NORMS FOR
GENERAL POPULATION

Stage of development	Norm and source	Mean	Passaic group Sigma	σ_M	No.
Birth weight					
Boys	7.0 pounds (Morse)	8.64 lbs.	2.40	0.25	91
Girls	7.0 pounds (Morse)	7.76 lbs.	2.08	0.38	31
Dentition	6-8 months (Bean)	7.41 mo.	2.31	0.20	133
Weaning	6-7 months (Anderson)	10.43 mo.	5.23	0.55	90
Sitting	6-8 months (De Lee)	6.59 mo.	1.96	0.18	121
Walking	15 months (Gesell & Thompson)	13.23 mo.	3.41	0.32	116
Talking	12-18 months (Gesell)	13.4 mo.	1.74	0.16	119

D. MEASURES OF GROWTH

Various measures of physical growth and development such as age of teething, sitting, walking, and talking which were available on this group suggested, on the average, rather normal physical development with considerable individual variation when compared against norms for the general population found in the literature. If any difference is noted, it is usually in the direction of slightly earlier-than-average development. Only in the matter of birth weight do we find a rather marked deviation for the group. The Passaic delinquents were found to be considerably heavier, with the males exceeding their population norm by more than a pound and the females exceeding their population norm by more than half a pound. In view of the heavily weighted European backgrounds in the foreign born population with a preponderance of the following ethnic groups: Northern European, Southeastern European and Italian, this weight difference might only reflect a difference in parental stock. That this physical factor might have some direct or even indirect bearing upon infant or childhood behavior has not been demonstrated.

E. BREAST FEEDING AND WEANING

Perhaps the most thought-provoking statistic is the one reporting that 78 per cent of the mothers breast-fed their children for an extended period averaging 10.43 months with a standard deviation of 5.23, showing great variations in the time of weaning. Granted that the breast feeding experience, as Plant (8) states is a very desirable "cuddling" experience which

translates a feeling of security in being wanted to the infant by means of motor tensions, we have the problem of disassociation of a very satisfying and, now, very firmly fixed behavior which has been established over a relatively long period.

A study of supporting data suggested that mothers of Passaic delinquents probably did not take time to follow a program of gradual weaning in view of the many pressing and immediate problems which the family faced. The fact that very few of the families showed any planned routine in their daily living makes one question the possibilities of gradual weaning having taken place. While no direct evidence in even a limited number of cases was available as to the conditions which surrounded the weaning period, we may make some inferences concerning the process from the homes, types of parents, their manner of living, and the conditions under which the families lived. As already suggested, the very large number of children in most of the delinquents' families, the many daily and pressing problems of living which the mother faced, the parent-attitude toward the unplanned and often unwanted burden which the infant presented, make it hardly likely that any pains were taken to see that the child was weaned gradually. It is more than likely, for example, that some of the mothers terminated nursing the child as soon as their strength and physical condition would allow them to resume their jobs at the mills in order to assist the family in its struggle for existence. The very irregular pattern of weaning itself suggests that accidental factors were at work in determining when the new feeding behavior would be introduced.

If, as is suspected, the weaning was abrupt and the infant was early frustrated, we may have the beginnings of a pattern of response which is essentially aggressive, in this way laying the foundation for future responses to frustrating situations.

SUMMARY

In this early antenatal and postnatal period we find several possible sources of severe frustration and conflict which center around the unplanned and probably unwanted births, children arriving in difficult and unfavorable households, and the late and irregular and, in all likelihood, abrupt weaning. In other measures of growth the delinquent group, on the average, appeared to approach the norms for the general population, except in the matter of birth weight.

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BOOKS

The *Journal of Genetic Psychology*, the *Journal of General Psychology*, and the *Journal of Social Psychology*, will buy competent reviews at not less than \$2 per printed page and not more than \$3 per printed page, but not more than \$15.00 for a single review.

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(*Gesell, A., & Ilq, F. L. Infant and Child in the Culture of Today.*
New York: Harper, 1943. Pp. 399.)

REVIEWED BY W. DRAYTON LEWIS

Infant and Child in the Culture of Today is a distinguished contribution to the literature of child development and should be of value to a wide field of readers. Many readers probably will not be interested in the volume in its entirety since it is intended to serve the needs of many groups. The authors have made each chapter as nearly a unit as possible so that the reader may peruse those sections of particular interest without too much loss of continuity.

The dominant theme of the volume is growth and the full impact of the presentation of the concept of growth is gained only as one reads through the volume. The techniques discussed become meaningful only as one becomes fully conscious of the importance of growth in child guidance so that it is essential that one read enough of the volume to become fully aware of the importance of this idea.

The underlying concept of the present volume is the concept of growth. This concept is essential not only for estimating the true nature of the child, but the reciprocal relations between the child and his culture. Indeed, one of the crucial tests of any culture-complex is the degree to which it gives scope to the nature and needs of growth, both in its children and adults. This test is of special importance in a democratic culture (p. 4).

The headings of the three parts of the volume, "Growth and Culture," "The Growing Child," and "The Guidance of Growth," clearly indicate one of the major purposes of the authors is to convey to the reader how essential it is that those who deal with children are conscious at all times of dealing with growing, developing individuals. The authors have succeeded well in writing a volume which makes it clear that this process of growth in the child is so vital and dynamic that it cannot be ignored safely.

The volume is based upon years of experience with "normal, near normal,

and problem children." It embodies the research of The Clinic of Child Development of the School of Medicine, Yale University, and studies, with the cooperation of parents, made in the service division of the Guidance Nursery of the Yale Clinic. Dr. Ilg also made an intensive study of 14 infants in Stockholm during 1936-37.

The volume is directed mainly to those who deal with children during the first five years of life but should prove of interest to those working with older children since it appears to be essential that those who work with older children should understand how they have come to be what they are. Intelligent parents will find much of interest in the volume even though some of its contents are directed especially to those engaged in the nursery school movement. A great deal of specific information and many techniques are presented for the benefit of the latter group.

A cardinal tenet in the philosophy advanced by Gesell and Ilg in this volume is that an understanding of child growth and development is essential to the development of a truly democratic society. Conversely, they state that the volume considers "the deep significance of a democratic culture for the psychological welfare of infants and young children." They point out that the relationship between a child and the culture in which he develops is highly reciprocal. There are, on the one hand, growth characteristics of the child which are so fundamental that no culture can supersede or ignore them. "The culture is refined through a discriminating recognition of these characteristics." The child, on the other hand, must be integrated and orientated into the culture of his group. This interaction is said to find its most significant expression in the family group.

The authors state that they use the term culture rather flexibly "to denote not only organized institutions and followings; but also the persons, chiefly parents, in the actual process of expressing those folkways by the rearing of children."

Gesell and Ilg express the belief that probably the most important ameliorative force that can function in the years of reconstruction that must follow the war is an intensive program for the conservation and development of the capacities of infants and young children. They believe that any realistic approach to the culture of the future must begin with the individual infant and take into consideration an important limiting factor, that is, the laws of child development. This is taken to mean that the culture of the future depends, in no small measure, upon the development of an adequate science of human development. An important thesis of the volume

is that only a democratic culture is adapted to developing to the maximum the capacities of every child.

Only through a democratically conceived system of developmental supervision can we attain a more just and universal distribution of developmental opportunity for infant and preschool children (p. 360).

They believe that a philosophy of individual development is essential if techniques are to be correctly applied and that a developmental philosophy must be a part of the democratic ideology; that a more adequate science of child development is imperative if a democratic culture is to be achieved. It is held that the science of human behavior and individuality can flourish only in a democracy since it alone is based upon respect for individuals and infants are individuals.

The thesis of Chapter One, "The Family in a Democratic Culture," is that the family is the most fundamental unit of our modern democratic culture. "It exalts the status of the family as a social group, favors reciprocity in parent-child relationships, and encourages humane discipline of the child through guidance and understanding." The stress here is upon the child's individuality. The parent's task is to recognize the uniqueness of each child, to interpret the child's individuality and to give it the best possible chance to grow and find itself. This is held not to imply indulgence, merely consideration for the child's individuality. They repeatedly emphasize their belief that the relationship between a democratic philosophy and recognition of the uniqueness of the individual is so intimate that the development of democracy is dependent upon the attainment of a deeper understanding and appreciation of child development.

The main burden of the volume is to make it very clear that the child is a developing individual with a unique pattern of growth. They point out that the most distinctive characteristic of the baby is that he is changing. That which makes him unique is his distinctive mode of growth.

The authors endeavor at all times to keep before the reader that the child is a growing individual. "Healthy growth" is defined as "a process whereby the child integrates and consolidates his achievements as he ascends from one level of maturity to another." Two points are emphasized in the discussion of the child's process of maturing. First, that maturing involves a "constant building up and interweaving of an infinitude of patterns and sub-patterns, always subject to the mechanism of developmental physiology." Second, that the process of maturing remains essentially the same throughout the life cycle, that its mechanisms are so "lawful and fundamental" that

children of similar chronological age are, in general, comparable with respect to their essential characteristics.

Mental growth is defined as a "modeling process which produces changes in form," or as "*a patterning process*," in so far as "mind is essentially the sum total of a growing multitude of *behavior patterns*." A behavior pattern is defined as "simply a movement or action which has more or less definite form." They hold that the most positive evidence that a child is growing is found in the increasing complexity of his behavior, in the changing and elaboration of his forms of behavior. The mind is said to "grow *like* the nervous system" and to "grow *with* the nervous system" in so far as growth is a pattern process which produces patterned changes in the nerve cells and corresponding changes in the pattern of behavior. Thus, mental growth can be measured by the increase in the complexity of behavior patterns.

Personality, it is pointed out, is essentially something that is growing, "a growing tissue which both yields and resists," and is constituted of "genuine patterns of behavior." The theory of the self advanced is closely related to that of Mead. The infant, through a slow and ever changing process, develops a self as he reacts and interacts with the culture. Development results in "a progressive detachment from the environment so that in the end the child comes to recognize that he is an individual, something distinctive in the culture." A recognition of others as selves appears before the child senses that he is an individual, a self. That is, he senses his own selfhood as a result of his contact with the people and things in his environment. A well-ordered home is held to provide the best background for the development of the self.

Emphasis is placed upon the necessity of controlling the interaction between the child and his culture so that an unbalanced condition will not result. The pressure of the culture must not result in complete self-effacement but it should be sufficient to curb adequately the growth of self-assertion under the compulsion of developmental urges.

The growth of personality, it is pointed out, is a product of the two opposing influences of cultural pressure and self-assertion and consequently, does not move forward evenly. Cultural pressure may appear to be dominant at one time whereas self-assertion may appear to have the upper hand at another time. This is emphasized in the thumb-nail sketches of typical children of various age levels. The one-year-old is described as "genial," fifteen months as "more demanding, more self-assertive," eighteen months as having a high degree of self-independence," two years as having a rudimentary sense of ownership and holding on to his possessions, two and a half

as having a "bad reputation for contrariness and going to contradictory extremes," as "oscillating between extremes," three years as "a kind of winning age" having a high degree of self-control and having himself well in hand, sensitive to the demands of his culture, four "is not so docile as three," is a little dogmatic, self-assertive and self-centered, five "is a Super-Three," "a self-assured, conforming citizen."

It might well be said that the most significant sentence in the volume, if any statement can be most significant, is, "Infants are individuals." They are individuals from birth. The infant is an individual because of his characteristic process of maturation which is "so fundamental that acculturation can never transcend maturation." He is an individual because the intrinsic forces of maturation operate to keep him from being the mere pawn of culture.

Believing the child's mode of growth to be the most important index and symptom of his individuality, the authors advocate that the mode of growth of each child be studied in detail in order that individual schedules, adapted to each child's needs, may be developed. These schedules are designated "self-demand schedules."

The child, under such a schedule, is said to live "by the internal clock of his fluctuating organic needs." This is a most significant departure from the generally accepted practice of the past few years of prescribing standard schedules for children of a given age group.

The self-demand schedule is to be implemented by a behavior day chart on which a record is kept of the child's activities throughout the twenty-four hours. The child in this way works out his own schedule. It is held that this principle of self-regulatory fluctuations is so fundamental as to apply not only to eating, sleeping, and infant play but also to the higher forms of learning and of mental organization.

The mother's problem is to avoid indulgence or excessive individualism. She must realize that the self-demand schedule does not imply these. Rather, she must understand that her task is to study the child carefully, watching the child's behavior day, rather than a fixed schedule and the clock on the wall. This will have profound consequences for the mother's attitude. Her objective will no longer be executive efficiency. Rather, she will strive to be perceptive of and sensitive to the child's behavior.

Cultural guidance, it is pointed out, also must consider the optimal needs of the individual organism. The child is found to be "a living, growing organism, an individual in his own right to whom the culture must attune itself "if his potentialities are to be fully realized." The rôle of the culture, then, is to intervene, assist, direct, postpone, encourage and discourage on

many occasions, but always in relation to the child's behavior equipment and maturity status.

Part II, "The Growing Child," presents an intensive study of the development of the child during the first five years. A series of "thumb-nail" sketches are given which are intended to satisfy the needs of the lay person who wishes to know how the child mind matures. These sketches are intended to present outlines of development that are sufficiently correct to give bearings. It is pointed out repeatedly that norms must be applied intelligently, in fact, should be applied by experts.

The first task of the parents, it is held, is to accept the child as he is and the question which should always be in their minds is, "What kind of child is he,—what is his true nature?" Since the care and management of the child depends both upon a knowledge of practical details of technique and the philosophy of the parent, it is important that the foundations of a developmental philosophy, the philosophy which is held to provide the best safeguard for the child's welfare, be laid before the birth of the child.

A particularly significant suggestion stresses the need of coöperation between the obstetrician and the pediatrician. Since both can help the mother and infant obtain a good start the work of the pediatrician should begin before birth. The authors stress the fact that breast feeding offers the most favorable condition for the initiation of a self-demand schedule. Therefore, both the obstetrician and pediatrician should encourage breast feeding and should see that the question is settled long before birth in order that it may have the best chance of success.

It is pointed out that the present procedure in maternity hospitals is not favorable to the institution of self-demand schedules. All infants are kept on the same rigid schedule irrespective of individual needs. This imposes a heavy strain on both infant and mother, who worries about the child when it is away from her, and prevents the institution of a schedule adapted to the needs of the infant.

A rooming-in arrangement for the daytime during the hospital period is suggested as being particularly worthy of consideration. Advantages cited are as follows: it would reduce the amount of manipulation to which the baby is subjected; the baby would benefit from the added oversight of the mother; the mother would be relieved of many worries and misgivings and would be protected from an excess of visitors; the baby would enjoy more natural and diverse stimulation; his rhythms would not escape notice; he would be in a position to be his natural self; the mother would gain more insight into the baby's needs as expressed in his pattern of behavior. The

arrangement should be flexible and altered to meet the needs of both mother and child. The authors believe the advantages would offset possible hazards. It is held that the rooming-in-arrangement and the behavior day chart should make the transition from hospital to home less a crisis for both mother and child.

Gesell and Ilg emphasize the fact that the child's development is not a smooth, consistent process. There are fluctuations. Bad days are said to be evidences of "thrustration" rather than "frustration." In other words, normal development is always toward increasing organization and consolidation but there are perturbations and irregularities reminiscent of an earlier stage. Patience is a necessary virtue since acts of a higher order cannot be hastened. "Everything in season," is a highly significant statement which is frequently repeated.

A series of behavior profiles are given for four, sixteen, twenty-eight, and forty weeks, one year, fifteen and eighteen months, two, two and a half, three, four, and five years. The authors continually emphasize that children of the same age are by no means all alike, that behavior profiles are merely suggestive.

The following series of behavior profiles is simply intended to show *in a general and approximate way* how a somewhat typical child, as a representative of his species and his culture, mounts the tall ladder with rungs placed at advancing ages (p. 91).

The foregoing behavior day is not set up as a model, but as a suggestive example (p. 97).

These characteristic traits are not, of course, equally marked in all children (p. 180).

The profiles, four to fifteen weeks inclusive, deal with sleep, feeding, elimination, bath and dressing, self-activity and sociability. Sections are included, beginning at eighteen months, on cultural and creative activities, nursery behavior, and nursery techniques. The profiles of two-and-a-half-, three-, four-, and five-year-olds are particularly vivid. The brief section on childhood and adolescence is so sketchy that it is difficult to see why it was included.

A large part of the last half of the volume is directed specifically to the nursery school worker and is probably only of incidental interest to most readers. Chapter twenty-one presents a philosophy for the nursery school. This philosophy is summarized in the title of the chapter, "The Nursery School as a Guidance Center."

The traditional policy of full-time attendance in the nursery school is

rejected. It is pointed out that the question, "Should my child go to nursery school?," is not a categorical question which permits of a yes or no answer. It is an "if" question. The factors which should determine when a child should and should not attend nursery school are listed.

Individualized nursery school attendance is advocated. "Ideally attendance in the nursery school should depend upon the maturity of the child, the disposition and interest of the child, and the motives of the parents." The time and amount of attendance should be adjusted to meet the optimal needs of the individual child. It is stated that the advantageous amount of attendance tends to increase, both with respect to the length of the session and the number of times per week, with increasing age. This suggests a sliding scale of attendance with sessions adjusted both with regard to their length and to the number of times per week. This philosophy recognizes that the child needs a gradual introduction to the nursery school.

The authors' philosophy of the nursery school is amplified in their "portrait" of the ideal nursery school guidance teacher. The designation, guidance teacher, emphasizes that the relation to the child is primarily one of guidance rather than of instruction or training. It is stated that the most fundamental qualification of the nursery school teacher is her philosophy. She must have a thorough understanding of child development, must be familiar with basic maturity differences of various age groups. She must be skilled in watchful waiting since she must be a watcher rather than a governor. "Sensitive to individual differences, she is exercising a high order of skill when she is watching alertly; she is not relaxing, she is waiting for the optimal moment when a quiet well-timed stroke of guidance will yield the maximum developmental result" (p. 281).

Gesell and Ilg hold that a philosophy of guidance—developmental guidance for the children, educational guidance for the parents—should be central and controlling in the nursery school since only such a philosophy can individualize and humanize the nursery school. They are careful to emphasize that the teacher must not become a mother substitute. The nursery's rôle is to supplement the home and should be so conceived that it "becomes a cultural tool which is deliberately utilized to increase the developmental opportunities of the child on one hand; and to assist his parents to understand the nature and needs of his development." Child guidance and parent guidance are considered here as inseparable concepts. The guidance-teacher is to function as a liaison person between child and parent, being careful never to usurp the mother's rôle. She is always to think of herself as an educational adviser, never as a practitioner.

The developmental philosophy which this volume expresses is held to take its point of departure from the child's nature and needs, to be sensitive to the relativities of growth and maturity and to acknowledge the profound forces of racial and familial inheritance which determine the growth sequences and the distinctive growth pattern of the individual child. The authors contend that their philosophy lies intermediate between the extremes of authoritarianism and laissez-faire. It holds for cultural guidance controls but believes in self-regulation and self-adjustment within these controls.

Three outstanding phases of the growth cycle are emphasized: the day cycle, self-regulatory fluctuations, and constitutional individuality. The day cycle emphasizes that the child grows each day, even though growth may be imperceptible. This daily growth is patterned, to no small degree, both by the characteristics of the child and the culture. Each day takes on new meaning as part of a large cycle of growth.

"Self-regulatory fluctuations" is used by way of emphasizing the fact that, when viewed in perspective, the course of development does not pursue a straight path. "The growing organism . . . oscillates along a spiral course toward maturity." The recurrent periods of disequilibrium are to be thought of as transitional periods during which the organism is creating a new ability or achieving a reorientation. Growth is pictured as a series of periods of disequilibrium, followed by periods of equilibrium. The periods of fluctuation are called self-regulatory in so far as they are expressions of a basic mechanism of readjustment. "The infant is constantly working toward and working out a schedule which is most suitable for his stage of development." Obviously recognition of these fluctuations is important for child guidance. "Constitutional individuality" emphasizes the fact that fluctuations are not equally marked in all children and that they do not conform to a uniform pattern. All children are said to be problem children in the sense that each child has a distinctive mode of growth.

Discussions of the following aspects of the growth complex are presented: sleep, feeding, bowel and bladder control, sex interests, and self-activity, sociability, self-containment. The emphasis in each case is upon growth and individual patterns of development.

Three aspects of sleep are stressed: sleep as behavior, learning to sleep, and individual patterns of sleep. Sleep is described as a positive function which involves a readjustment of the whole machinery of the organism, including the central nervous system, to protect the total and remote welfare of the organism. Perfect sleep is a total response. It is not a simple func-

complex; and that any individual function or "habit" is inevitably modified by ever changing contexts. Habits do not grow. The child grows.

The discussion of personal and sex interests represents the best of recent thought. It rejects both of the extreme viewpoints, that is, the older view that would carefully guard the child from all such knowledge and the more recent view that insists that all children must know all the facts of life before they enter school. Gesell and Ilg emphasizes growth and maturity in their discussion of the problem and hold that instruction should be determined by the maturity and the interests of the child. Specific guidance should be adjusted to the child's ability to assimilate and, while it is recognized that there is some danger of giving "too little and too late," there is also danger in "too much and too early."

The appendices include the behavior day chart, the program of the Yale Guidance Nursery, a list of toys, play materials and equipment, a list of musical records for infants and young children, and a selected bibliography for those who work with young children.

This volume should afford a great deal of assistance to those who are seeking to understand young children whether in the rôle of parent or teacher. The volume is so constructed as to give it maximum utility. It is easy to find material of immediate interest should the reader have neither time to or interest in perusing the entire volume. Some of the material is of immediate interest only to those who are closely connected with the nursery school but the remainder of the material should have a wide appeal.

The style of writing used in this volume—terse, pointed sentences, with frequent repetition of fundamental ideas—is well suited to the material and purposes of the author. The viewpoint is essentially sane and practical. The reviewer has found that the horizontal type of organization used in this volume is particularly well suited to the needs of many who are interested in a child or children of a specific age. This type of presentation is not as effective as the vertical in developing the idea of growth and development, which is the major burden of the volume, so that the reader who devotes himself exclusively to a profile for a given age level will miss an important emphasis. For this reason, the reader must necessarily cover the series of profiles if the objective of the volume is to be achieved.

Some of the weakest points in our present methods of child training are attacked, particularly methods of habit training and sex education. Excessive zeal has characterized the attitude toward habit training and sex education and there seems to be little doubt that children will benefit

greatly if the more sane viewpoint of this volume came to characterize the early training of children. The prevailing system in maternity hospitals appears to be essentially inimical to the best interests of both mother and infant. One need only to listen to the frantic crying of the infants in the nursery of the maternity ward, to be aware of the nervous tension of the mothers to realize that the present system has serious defects. The suggestion advanced in this volume of a rooming-in-arrangement appears to be essentially sound and it is to be hoped that it proves practical and, if practical, comes into general use.

This volume is subject to the same defect, if it can be called a defect, found in Gesell's other writings. The children investigated at Yale are somewhat above the average which means that the developmental norms and the profiles show development in advance of that which is characteristic of the average child. It is true that norms can merely serve as guides and, in so far as this is true, carefully constructed norms are of about equal value. Even so, one cannot but wish that norms, such as are given here, could have been based on more nearly average children. Norms are undoubtedly necessary evils but, at the present time, it would probably be better if they were not emphasized to the degree that they are emphasized in this volume. The evil arises, of course, from the misuse of the norms since there is no substitute for intelligence in the application of them, and all too often they are not applied intelligently. The volume contains numerous warnings against the abuse of norms but too many people take norms as the law. It is for this reason that we express the regret that some of the profiles are so vividly drawn. It is inevitable that many will believe a child is not normal if his characteristics do not resemble those of the profile for the age.

The material presented in this volume makes it quite clear that assembly-line methods will not work with infants. Anyone who has had close contact with a growing child must realize that statistics have been taken too seriously or, perhaps we should say, have been misapplied. Norms, standardized schedules, and rigid regimen are products of statistics which have been taken too seriously. Fortunately for growing children, most parents have had common sense enough not to take norms and schedules too seriously, or have been forced by their very failures to apply them intelligently. It will be an important step forward when the idea of raising babies by assembly-line methods banishes from the literature, and this volume should contribute in that direction. It must be recognized that procedures advocated by

Gesell and Ilg require more intelligence in application than assembly-line methods, but, after all, there is no substitute for intelligence.

The volume, it must be emphasized, presents material which summarizes years of careful study with children. The pertinent problem at the present time is to get the material into the hands of those who can make use of it. The lag between the findings of research and practice is so great that we fear that the sound ideas advanced in this volume will be long getting into practice. The volume is highly recommended to all who work with young children.

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(Hollingworth, L. S. *Children Above 180 IQ*. New York: World Book, 1942. Pp. 332.)

REVIEWED BY NATHAN ISRAELI

The uppermost levels of mental activity are considered by this book. It traces the mental development of very high *IQ*'s. It draws the lower limit for near genius and genius at 180 *IQ*. It is fully assumed that the *IQ* is an excellent index of intellectual capacity and of general capability for attainment of an extremely high order in politics, science, law, education, industry, literature, or in other fields. Only *IQ*'s of 180 or higher are believed to be able to originate things of the first magnitude in importance—at least that is a primary implicit assumption here. The exact nature of originality is left indeterminate. This book describes 12 different children discovered during a search for the brightest children of metropolitan New York which continued over a period of 23 years. In a foreword, the editor dates this book back to an unpublished draft written in 1924 and then to the time it was under revision by Professor Leta S. Hollingworth at the time of her death in 1939. The editor, Professor Harry L. Hollingworth, added important materials and in the last part of the book combined several of the author's articles.

Professor Hollingworth sought to justify the criterion of the 180 *IQ* as the starting point of genius on the basis of its restrictiveness and its conformance with the dictionary concept of genius. She described several different levels of superiority and seems to have wavered between 170 *IQ* and 180 *IQ* as the dividing line. Her levels are of interest.

IQ 130-150. Optimum range of intelligence considering personal happiness, health, adjustment and character. Tend "to win the confidence of their contemporaries, which gives them leadership." Need opportunity in school to work unhampered rather than enrichment. Children at or above *IQ* 140 waste half their time in public school.

IQ 150 and above. This group is in need of enrichment of curriculum. Mastery of manual trades is recommended as additional to professional training.

IQ 160 and above. Majority of children in this group find almost endless difficulty in making social contact; play little with other children and tend to become isolated unless special facilities are provided.

IQ 170 and above. Includes those who "not only *conserve* thought in its abstract reaches, but who can *originate* new thoughts, new inventions, new patterns, and who can solve problems" (319). They go through public school unrecognized and waste all their time there.

The author believed that Dr. Catherine Cox had underestimated the *IQ* of the 300 geniuses she had selected from Cattell's list of the thousand most eminent individuals of history. As she put it, "a large number of the persons included in Cox's study would have tested in childhood at or above 180 *IQ*" (p. 31). Cox was quite aware of an underestimation of the *IQ*'s and introduced a correction. She listed only seven eminent men of 180 *IQ* or over: Macaulay, Pascal, Grotius, Goethe, Leibnitz, and Mill. By examining her corrected *IQ*'s, of her 282 eminent men, corrected to the seventeenth or twenty-sixth birthday, fifty-seven can be found to have had an *IQ* of 180 or higher. Cox's method gives too much range or spread in the estimates of the *IQ*: there is no justification for an *IQ* of 105 for Copernicus or of 110 for Cromwell; Kant fell as low as 135 and Spinoza as low as 130! Hollingworth's criticism has merit.

Her disregard of Terman's dividing line of 140 *IQ* in no way detracts from the laurels of the California gifted children. Terman and his associates made no extravagant assumptions about them. They were not concerned with the supremely eminent individuals and believed that "there is abundant work in this day and age for *IQ*'s of 140 and 150, and that it is probably at this level that rightly directed educational endeavor can be most effective." Hollingworth sampled the highest *IQ* levels in the hope of discovering beforehand potential great men and women or with the aim of getting a closer view of the development and activity of eminent individuals.

There is an important parallel to be drawn between the outlook of Terman and that of Hollingworth. Both realized that the measurement of gifted children covers their entire life span and they spoke of follow-up reports to be made in the future. Hollingworth felt that such long range research should be adequately provided for by Universities.

This work should be followed up systematically and the study of the uppermost levels of intelligence, creativeness, and eminence should be carried on in other directions. There is still a missing link in studies of gifted children. Their accomplishments in adulthood are as yet to be described. For instance, one-third of the gifted children described by Hollingworth were judged to have shown a high order of originality; what remains to be seen is whether their attainments will be on an equally high plane. Sterility of trained researchers and thinkers, as remarked of some Ph.D.'s, is a factor warranting attention. Obstacles preventing achievement is another factor. It is the author's faith that (p. 290) "as for *originations*, whereby one generation progresses beyond another in control of the physical environment and of preventable evils, we are learning that only a few in the topmost

ranges can produce them in the realm of abstractions." It is urged that "the problem of the correlation of originality with intelligence scores perhaps deserves more careful study than it has received." Indeed, civilization cannot afford any wastage of originality. The non-recognition of the superior *IQ*'s by their school teachers and their subsequent failure to function in posts of extensive responsibility is a waste of human resources—that is another contention emerging from this book. Professor Hollingworth urged "recognition of national welfare involved in education plans for the unusual student (xv). Indeed, she held that "the education of the best thinker should be an education for initiative and originality." In view of the extreme emphasis placed upon the importance of originality, it becomes all the more necessary to know more about it. Professor Hollingworth is seen in practical contact with the educational problems of gifted children (lower than *IQ* 180) and unfortunately stopped short at the high school level. She fully realized the complicated nature of such problems and held that (p. 316) "years of realistic hard and intelligent work will have to be done, by way of experiment with various groups of adolescents."

. Certainly, the age of manpower shortage must continue such studies of genius through application of various psychological techniques and a long term follow-up of generations of gifted persons. Incidentally, this war in which technical experts are at a premium should shed considerable light concerning the rôle of the California and New York high *IQ*'s.

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BOOKS RECENTLY RECEIVED

(There will always be two pages of book titles, listed in the order of receipt, i.e., the most recently received books will be found at the end of the list.)

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